TS 25.331 V1.1.0 (1999-06)

Technical Specification

3rd Generation Partnership Project (3GPP); Technical Specification Group (TSG) RAN; Working Group 2 (WG2);

RRC Protocol Specification

Reference

<Workitem> (<Shortfilename>.PDF)

Keywords

<keyword[, keyword]>

3GPP

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Contents

Intellectual Property Rights

[Editor's note: This paragraph has been modified from corresponding ETSI text in anticipation of a new version regarding 3GPP.]

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Foreword

This Technical Specification has been produced by the 3GPP.

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of this TS, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version 3.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 Indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the specification.

1. Scope

The scope of this specification is to describe the Radio Resource Control protocol for the 3GPP radio system.

2. References

[1] UMTS 25.XX, 'Vocabulary for the UTRAN'

[2] 25.301, 'Radio Interface Protocol Architecture'

[3] 25.303, 'Description of UE states and procedures in connected mode'

3. Definitions, Symbols and abbreviations

3.1 Definitions

See [1] for definition of fundamental concepts and vocabulary

3.2 Abbreviations

ACK	Acknowledgement
AS	Access Stratum
BCCH	Broadcast Control Channel
BCFE	Broadcast Control Functional Entity
CCCH	Common Control Channel
CN	Core Network
DCA	Dynamic Channel Allocation
DCCH	Dedicated Control Channel
DCFE	Dedicated Control Functional Entity
DCH	Dedicated Channel
DTCH	Dedicated Traffic Channel
FACH	Forward Access Channel
FAUSCH	Fast Uplink Signalling Channel
FDD	Frequency Division Duplex
FFS	For Further Study

ID	Identifier
L1	Layer 1
MAC	Media Access Control
MS	Mobile Station
NAS	Non Access Stratum
NW	Network
ODMA	Opportunity Driven Multiple Access
PCCH	Paging Control Channel
PCH	Paging Channel
PNFE	Paging and Notification Control Functional Entity
QoS	Quality of Service
RAB	Radio access bearer
RLC	Radio Link Control
RNTI	Radio Network Temporary Identifier
RFE	Routing Functional Entity
RNC	Radio Network Controller
RRC	Radio Resource Control
SAP	Service Access Point
TDD	Time Division Duplex
TF	Transport Format
TFCS	Transport Format Combination Set
TFS	Transport Format Set
TME	Transfer Mode Enitity
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
UNACK	Unacknowledgement
UTRAN	UMTS Terrestrial Radio Access Network

4. General

The functional entities of the RRC layer are described below:

- Routing of higher layer messages to different MM/CM entities (UE side) or different core network domains (UTRAN side) is handled by the Routing Function Entity (**RFE**)

- Broadcast functions are handled in the broadcast control function entity (**BCFE**). BCFE offers RRC services by the GC-SAP and uses the lower layer services provided by Tr-SAP.
- Paging of idle mode UE(s) is controlled by the paging and notification control function entity (**PNFE**). PNFE offers RRC services by the Nt-SAP and uses the lower layer services provided by Tr-SAP.
- The Dedicated Control Function Entity (**DCFE**) handles all functions specific to one UE. The DCFE offers RRC services by the DC-SAP and can use lower layer services of UM/AM-SAP and Tr-SAP depending on the message to be sent and on the current UE service state.
- The Transfer Mode Entity (TME) handles the mapping between the different entities inside the RRC layer and the SAP's provided by RLC.

Logical information exchange is necessary also between the RRC sublayer functional entities. Most of that is implementation dependent and not necessary to present in detail in a specification.

Figure 1 shows the RRC model for the UE side and Figure 2 shows the RRC model for the UTRAN side.

[Editors note: Some further clarification in the diagrams may be beneficial to acknowledge the fact that a DC-SAP for example might be offered over a dedicated channel (with RRC terminated in SRNC) whereas GC-SAP and Nt-SAP may be offered over BCCH, PCH respectively in which cases RRC is located in Node B. It could be concluded from the figure that these channels use the same SAP offered by RLC (Tr-SAP, UM-SAP, AM-SAP) whereas in fact they will use different SAP's, though the SAP type might be the same]

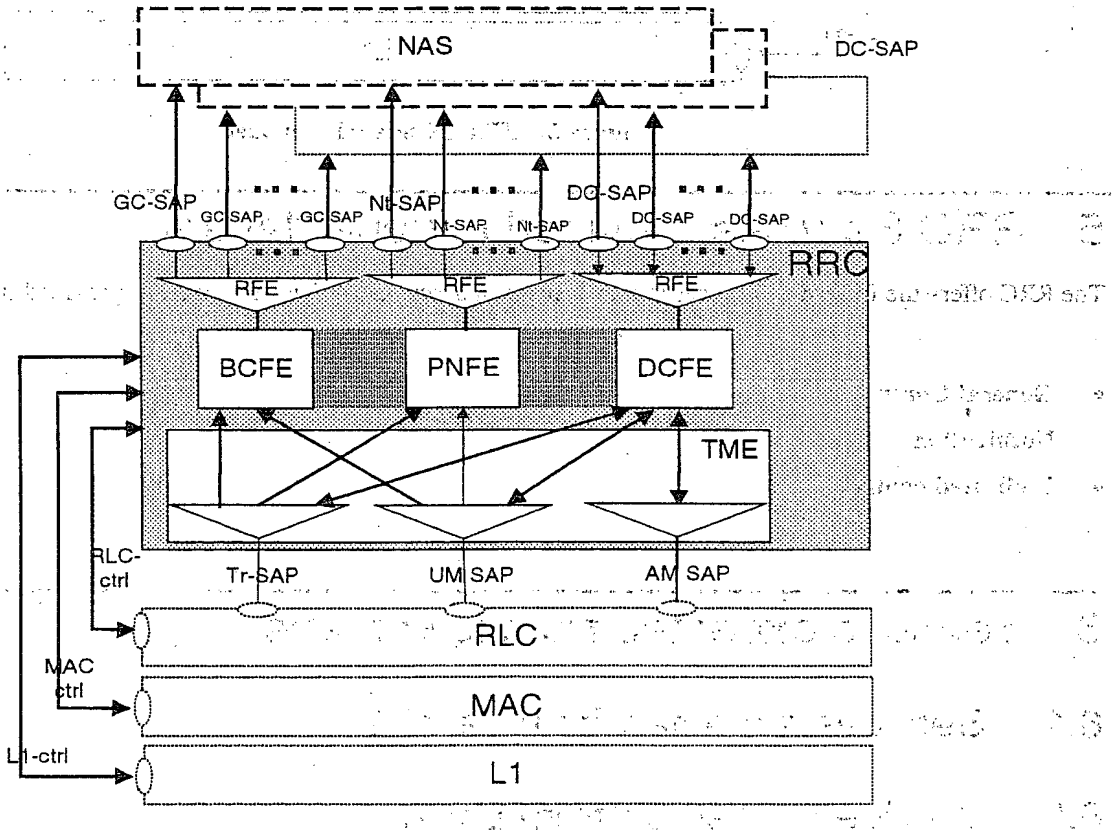

Figure 1) UE side model of RRC

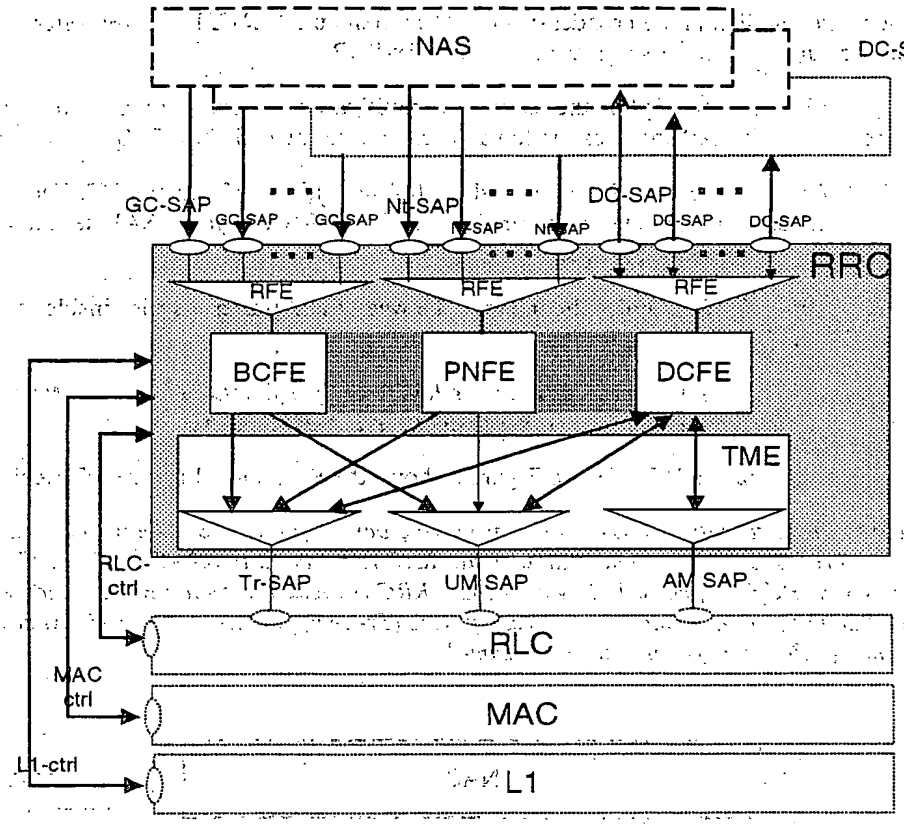

Figure 2) UTRAN side RRC model

5 RRC Services provided to upper layers

The RRC offers the following services to upper layers, a description of these services is provided in [2].

- **General Control**
- **Notification**
- **Dedicated control**

6 Services expected from lower layers

6.1 Services expected from Layer 2

6.2 Services expected from Layer 1

7 Functions of RRC

The RRC performs the functions listed below, a more detailed description of these functions is provided in YY.01:

- **Broadcast of information provided by the non-access stratum (Core Network).**
- **Broadcast of information related to the access stratum.**
- **Establishment, maintenance and release of an RRC connection between the UE and UTRAN.**
- **Establishment, reconfiguration and release of Radio Access Bearers**
- **Assignment, reconfiguration and release of radio resources for the RRC connection.**
- **RRC connection mobility functions.**
- **Arbitration of the radio resource allocation between the cells.**
- **Control of requested QoS.**
- **UE measurement reporting and control of the reporting.**
- **Outer loop power control.**
- **Control of ciphering.**
- **Slow DCA.**
- **Broadcast of ODMA relay node neighbour information**
- **Collation of ODMA relay nodes neighbour lists and gradient information**
- **Maintenance of number of ODMA relay node neighbours**
- **Establishment, maintenance and release of a route between ODMA relay nodes**
- **Interworking between the Gateway ODMA relay node and the UTRAN**
- **Contention resolution (TDD mode)**
- **Paging/notification.**

The following functions are regarded as further study items:

- **Initial cell selection and re-selection in idle mode.**
- **Congestion control.**
- **Routing of higher layer PDU's (in UE side to correct higher layer entity and in UTRAN side to correct RANAP entity). The requirement for this function will be dependent on the decision made by SMG12.**

8 Elementary RRC procedures

This section describes elementary RRC procedures used in the idle mode and in the connected mode. More description on the different UE modes is provided in [2].This section also describes procedures for establishing and releasing an RRC connection.

8.1 Idle mode procedures

8.1.1 Broadcast of system information

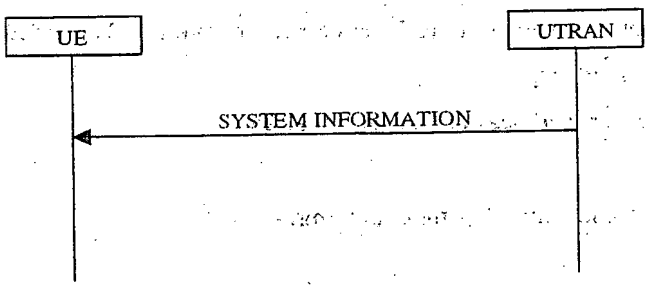

Figure 3) Procedure for broadcast of system information

This procedure is used for broadcasting system information from the network to all UEs in a cell. Only UEs that listen to the logical channel BCCH can be reached by this procedure. The system information is repeated on a regular basis and it includes information from both the access stratum and the non-access stratum. The initiative to change the system information can come from both the access stratum and non-access stratum.

The SYSTEM INFORMATION message is regularly broadcast on the BCH by the UTRAN. Based on this information the mobile station is able to decide whether and how it may gain access to the system via the current cell.

The contents of the SYSTEM INFORMATION messages can come from RRC and from the physical layer measurements of each cell *[Editors note: Other sources for the system information are also allowed].*

The information may be grouped into the following classes:

- information giving unique identification of the current network, location area, UTRAN registration area and cell
- information used for candidate cell measurements for handover and cell selection procedures
- information describing the current control channel structure
- information controlling the random access channel utilization
- information defining different options supported within the cell
- protocol information

[Note: The set of messages that forms the system information is FFS. However, basically the same elementary procedure can be applied for all messages.]

8.1.2 Paging

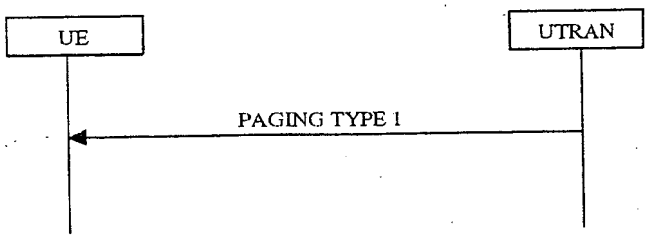

Figure 4) Paging procedure

This procedure is used to broadcast a PAGING TYPE 1 message from the network to selected UEswhich are in idle mode. Only UEs which listen to the correct paging group can be reached by this procedure. The PAGING TYPE 1

message can be sent to either one or many UEs at the same time.

[Note, the following is FFS]: The PAGING TYPE 1 message includes BCCH Modification Information, which indicates the modification of the System Information on BCCH. The coding of BCCH Modification Information is FFS.

[Note: The addresses which are to be used in the paging message (eg IMUI etc) are still to be defined]

[Note: The number of addresses to be used in the paging message needs to be defined].

[Note: the requirement to have different paging messages for UTRAN originated and CN originated RRC connected mode paging needs to be confirmed]

8.1.3 Notification

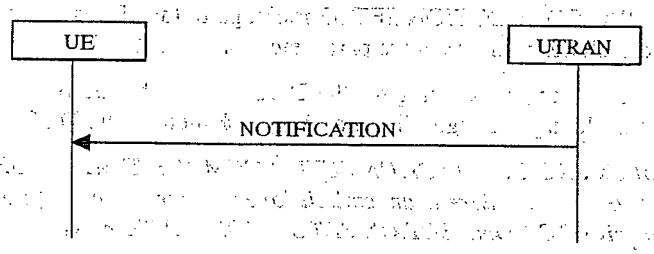

Figure 5) Notification procedure

This procedure is used for broadcast of notification information to selected UEs in a cell. Only UEs that listen to the correct notification group can be reached by this procedure. The initiative to send a NOTIFICATION can come from both the access stratum and the non-access stratum. NOTIFICATION can be sent to either one or many UEs at the same time.

[Note: Notification may be cell specific]

[Note: The usage of this procedure is FFS.]

8.2 RRC connection establishment and release procedures

8.2.1 RRC Connection Establishment

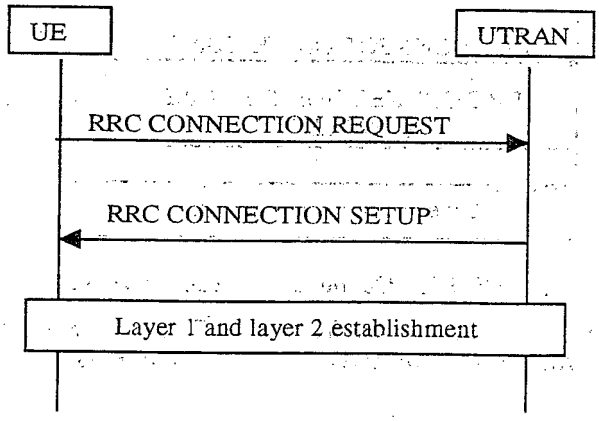

Figure 6) Procedure for RRC connection establishment

This procedure is initiated from the UE side to establish an RRC connection, as a result of either:

(1) A request from the non-access stratum to establish the first signalling connection for the UE *[Note: For a GSM-based Core Network some examples of reasons are: CM Establishment Request and Location Update Request.]*, or

(2) A received paging request. *[Note: Whether the RRC connection is established with or without an explicit request from UE non-access stratum in this case is FFS.]*

The RRC connection establishment is initiated by the UE, which leaves the idle mode and sends an RRC CONNECTION REQUEST message using unassured mode on the uplink CCCH. *[Note: The initial identification of the UE is FFS.]*

As initial identification in the RRC CONNECTION REQUEST the UE uses a unique Non access stratum identity. This NAS identity could be either TMSI + LAI, P-TMSI + RAI, IMSI or IMEI. *[Note: This is pending confirmation from WG1 that the RACH can support the required payload when this type of ID is used]*

The UTRAN makes an assignment of radio resources and the Radio Network Temporary Identity (RNTI) to be used by the UE.The UTRAN sends an RRC CONNECTION SETUP message to the UE using unassured mode on the downlink CCCH. The message includes radio resource parameters and the RNTI.

The UE configures the layer 2 and layer 1 processing for the DCCH using the radio resource parameters. The procedure successfully ends when the layer 2 signalling link is established on the DCCH.

[Note: The necessity of an explicit RRC CONNECTION SETUP COMPLETE MESSAGE from the UE to the UTRAN on layer 3 is FFS. One assumption is, that there is an explicit layer 2 peer-to-peer signalling to establish the signalling link, making an explicit RRC CONNECTION SETUP COMPLETE message on layer 3 unnecessary.]

Note also that on receipt of an RRC CONNECTION REQUEST message, the RNC can allocate a FAUSCH channel for the UE for the particular cell, in which the UE is camping on, or FAUSCH channels for a number of cells of the URA, in which the UE is currently staying depending on the type of UE. The FAUSCH channels allocated are conveyed to the UE in the RRC CONNECTION SETUP message.The following procedure which could be used during RRC connection establishment is for further study:

On receipt of an RRC CONNECTION REQUEST message, the RNC may allocate a dedicated channel to the mobile station. It is also possible to setup macrodiversity at this point. To do so means that the RRC CONNECTION REQUEST message must contain a measurement report. In this case, the RNC executes branch addition (physical channel activation) to each cell (/NodeB) that will be included in the active set. After the physical channel(s) are setup on the UTRAN side, the RRC CONNECTION SETUP message is sent to the UE on the FACH channel.

8.2.2 RRC Connection Release

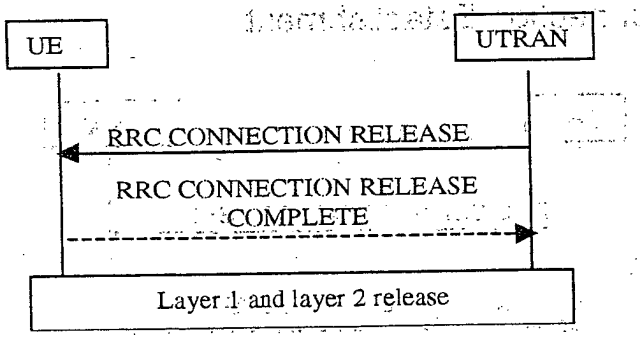

Figure 7) RRC Connection release procedure

A normal RRC connection release procedure is initiated from the UTRAN, e.g. when the last Signaling Connection is released. *[Note: Release in case of RRC connection failure is FFS.] [Note: Possibility for UE initiated RRC connection release is FFS.]*

Two variants of this procedure have been identified:

a) RRC connection release from state where dedicated physical channel is available

b) RRC connection release from state where there is no dedicated physical channel

In the former case (a) the UTRAN sends an RRC CONNECTION RELEASE message to the UE using acknowledged

mode on the DCCH. The UE then leaves the Connected Mode and initiates release of the layer 2 signalling link. The RRC Connection Release procedure ends when all UE dedicated resources (such as radio resources and radio access bearers) tied to the RRC connection are released and the RRC layer is transferred to idle mode.

In the latter case (b) the RRC layer entity in the network issues an RRC CONNECTION RELEASE message using unacknowledged mode on the DCCH. Upon reception of this message the UE-RRC sends an RRC CONNECTION RELEASE COMPLETE message to UTRAN using acknowledged mode on the DCCH. *[Note: Depending on RLC design, the acknowledgement to RRC CONNECTION RELEASE could be piggybacked to the RRC CONNECTION RELEASE COMPLETE MESSAGE, resulting in no additional messages. Therefore acked / unacked transmission is considered FFS.]*. After receiving the RRC CONNECTION RELEASE COMPLETE message the network RRC layer releases L2 resources and the RRC entity dedicated to this UE goes to Idle Mode. On receipt of the RRC CONNECTION RELEASE COMPLETE message the network releases the FAUSCH channels allocated for the UE going to idle mode if FAUSCH channels have been allocated during RRC connection establishment.

8.2.3 RRC Connection re-establishment

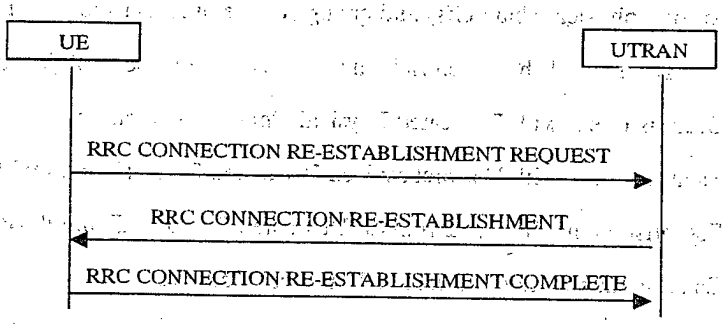

Figure 8) RRC Connection re-establishment

RRC connection re-establishment is needed, when a UE loses radio connection due to e.g. radio link failure. After having selected a new cell, the UE RRC sends the NW RRC an RRC CONNECTION RE-ESTABLISHMENT REQUEST message. The NW RRC configures the NW and acknowledges the connection re-establishment to the UE RRC with an RRC CONNECTION RE-ESTABLISHMENT message. This message may contain the FAUSCH channel(s) valid for this cell, and possibly other cells of the same URA, if FAUSCH channels have been allocated earlier. The UE RRC configures the UE L1 to activate the new radio link(s). After the UE has synchronised to at least one radio link, the MAC and RLC layers can be configured (if necessary).

[Note: The necessity of an explicit RRC CONNECTION REESTABLISHMENT COMPLETE message to be sent from the UE to the UTRAN on layer 3 is FFS. One assumption is, that there is an explicit layer 2 peer-to-peer signalling to establish the signalling link, making an explicit RRC CONNECTION REESTABLISHMENT COMPLETE message on layer 3 unnecessary].

8.3 RRC connected mode procedures

8.3.1 Radio Access Bearer Related Procedures

8.3.1.1 Radio Access Bearer Establishment

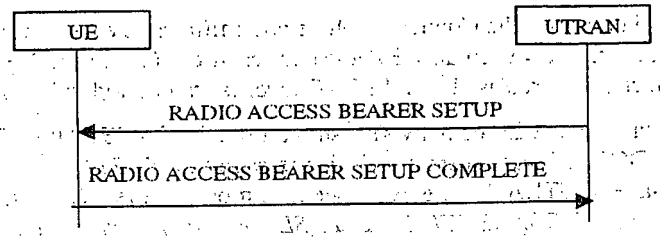

Figure 9) Radio Access Bearer Establishment Procedure

This procedure establishes a new radio access bearer. The establishment includes, based on QoS, assignment of RLC parameters, multiplexing priority for the DTCH, scheduling priority for DCH, TFS for DCH and update of TFCS. It may also include assignment of a physical channel(s) and change of the used transport channel types / RRC state.

There are a number of alternative methods by which radio access bearers may be established:

a) Radio Access Bearer Establishment with Dedicated Physical Channel Activation

b) Radio Access Bearer Establishment with Unsynchronised Dedicated Physical Channel Modification

c) Radio Access Bearer Establishment with Synchronised Dedicated Physical Channel Modification

d) Radio Access Bearer Establishment without Dedicated Physical Channel

A Radio Access Bearer Establishment is initiated when the RRC layer in the network sends a RADIO ACCESS BEARER SETUP message to its peer entity. This message contains L1, MAC and RLC parameters and in the synchronised case an activation time. RRC on the UE side then configures L1 and MAC and creates a new RLC entity associated with the new radio access bearer. A similar reconfiguration is also done on the network side. The UE then sends a RADIO ACCESS BEARER SETUP COMPLETE message back to the network.

[Note: The possibility of establishing multiple radio access bearers within one message is FFS]

8.3.1.2 Radio Access Bearer Release

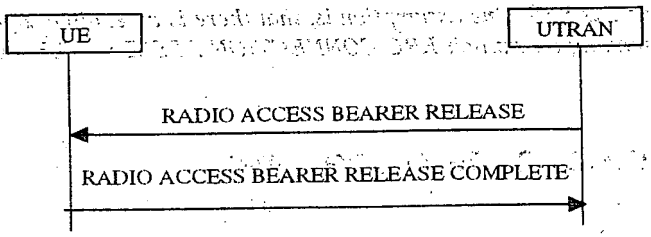

Figure 10) Radio Access Bearer Release Procedure

This procedure releases a radio access bearer. The RLC entity for the radio access bearer is released. The procedure may also release a DCH, which affects the TFCS. It may include release of physical channel(s) and change of the used transport channel types / RRC state.

The Radio Access Bearer Release procedure is initiated by the RRC layer on the NW side. A RADIO ACCESS BEARER RELEASE message is sent from the RRC layer in the network to its peer entity in the UE. This message includes possible new L1, MAC and RLC parameters for remaining radio access bearers and indentification of the radio access bearer to be released. *[Note: In synchronised case a specific activation time would be needed for the change of L1 and L2 configuration to avoid data loss.]*

The RRC on the UE side configures L1 and MAC, and releases the RLC entity associated to the released radio access bearer . A similar reconfiguration is also done on the network side.

Finally, RRC on the UE side sends a RADIO ACCESS BEARER RELEASE COMPLETE message to the network.

Currently the following alternative methods have been identified by which Radio Access Bearers may be released:

a) Radio Access Bearer Release with unsynchronised dedicated physical channel modification

b) Radio Access Bearer Release with synchronised dedicated physical channel modification

c) Radio Access Bearer Release without dedicated physical channel modification

[Note: When a radio access bearer carried on a DCH is released, it is FFS, whether the UE should acknowledge the RADIO ACCESS BEARER RELEASE message before making the reconfiguration (on the DCH) or after making the reconfiguration (on the RACH)]

[Note: The possibility of releasing multiple radio access bearers within one message is FFS]

8.3.1.3 Radio Access Bearer and signalling link Reconfiguration

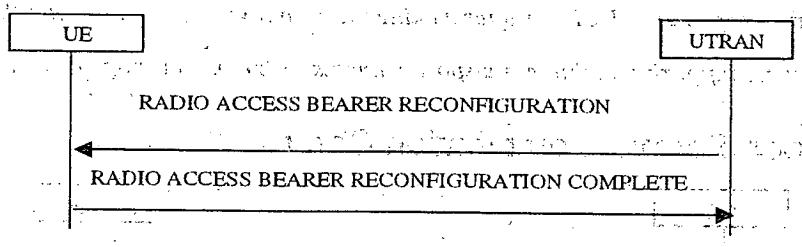

Figure 11) Radio Access Bearer and signalling link Reconfiguration Procedure

This procedure reconfigures parameters for a radio access bearer or the signalling link to reflect a change in QoS. It may include change of RLC parameters, change of multiplexing priority for DTCH/DCCH, change of DCH scheduling priority, change of TFS for DCH, change of TFCS, assignment or release of physical channel(s) and change of used transport channel types.

Currently identified options by which Radio Access Bearers may be reconfigured:

a) Synchronised Radio Access Bearer reconfiguration

b) Unsynchronised Radio Access Bearer reconfiguration

[Note: When the reconfiguration involves a change of transport channel (eg. from DCH/DCH to RACH/FACH), it is FFS, whether the UE should acknowledge the RADIO ACCESS BEARER RECONFIGURATION message before making the reconfiguration (eg. on the DCH) or after making the reconfiguration (eg. on the RACH)]

[Note: The possibility of reconfiguring multiple radio access bearers and signalling links within one message is FFS]

8.3.2 Transport Channel Reconfiguration

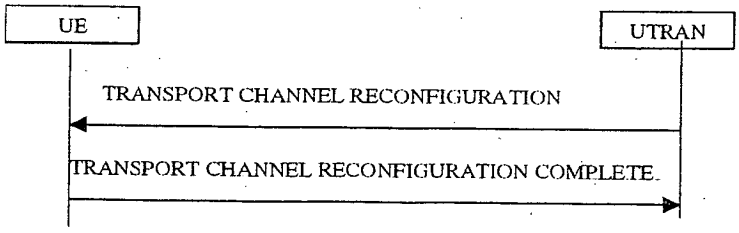

Figure 12) Procedure for transport channel reconfiguration

This procedure configures parameters related to a transport channel such as the TFS. The procedure also assigns a TFCS and may change physical channel parameters to reflect a reconfiguration of a transport channel in use.

A change of the transport format set for a transport channel is triggered in the RRC layer in the network. A TRANSPORT CHANNEL RECONFIGURATION message is then sent from the RRC layer in the network to its peer entity. This message contains the new transport format set, a new transport format combination Set and may include physical channel parameters, i.e. new parameters for L1 and MAC. *[Note1: In a synchronised procedure a specific activation time is needed for the change of L1 and L2 configuration to avoid data loss.]* When this message is received in the UE a reconfiguration of L1 and MAC is done. A similar reconfiguration is also done on the network side. Finally, a TRANSPORT CHANNEL RECONFIGURATION COMPLETE message is returned to the network.

Currently identified options by which transport channels may be reconfigured:

a) Synchronised transport format set reconfiguration

b) Unsynchronised transport format set reconfiguration

c) Pre-configuration of TFS/TFCS for a transport channel not yet in use

[Note: When the reconfiguration involves a change of transport channel it is FFS, on what channel the UE should acknowledge the TRANSPORT CHANNEL RECONFIGURATION message, ie. whether it should acknowledge before making the reconfiguration (eg. on the DCH) or after making the reconfiguration (eg. on the RACH)]

[Note: The possibility of reconfiguring multiple transport channels within one message is FFS]

8.3.3 Transport Format Combination Control

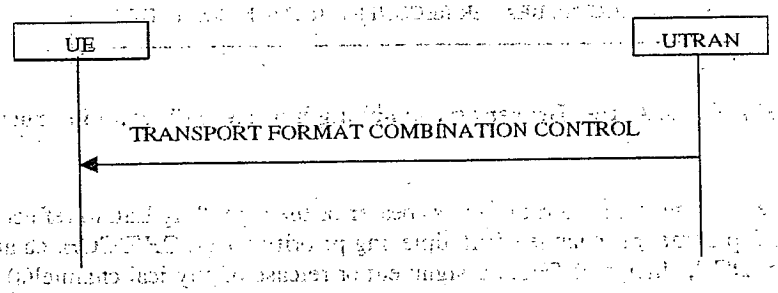

Figure 13) Transport Format Combination Control Procedure

The network uses this procedure to control which transport format combinations (within the transport format combination set) can be used by the UE in the uplink. An example of when this procedure might be used is when a congestion situation occurs such that it is desirable to temporarily restrict the TFC's in use.

This procedure is initiated with a TRANSPORT FORMAT COMBINATION CONTROL message sent from the network to the UE. This message defines the subset of the complete Transport Format Combination Set which the UE is allowed to use, or in case of relieving a temporary restriction, a TFCS which is identical to the complete original set. The UE then reconfigures MAC which thereafter uses the new TFC set. The TRANSPORT FORMAT COMBINATION CONTROL message may be sent as unacknowledged data transfer (FFS) since it is assumed that it does not matter if one UE out of many misses this information and stays with the old TFCS.

8.3.4 Physical Channel Reconfiguration

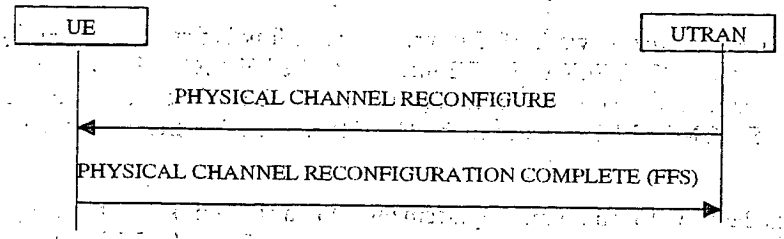

Figure 14) Physical Channel Reconfiguration procedure

This procedure may assign, replace or release a set of physical channels used by an UE. As a result of this, it may also change the used transport channel type (and RRC state). For example, when the first physical channel is assigned the UE enters the DCH/DCH state. When the last physical channel is released the UE leaves the DCH/DCH state and enters a state (and transport channel type) indicated by the network. A special case of using this procedure is to change the DL channelization code of a dedicated physical channel. *[Note: The procedure does not change the active set, in the downlink the same number of physical channels are added or replaced for each radio link.]*

Currently identified motivations for using this procedure (methods by which physical channels may be reconfigured):

a) Assignment of dedicated physical channel (switch from common channels to dedicated physical channel)

b) Synchronised replacement (modification) of dedicated physical channel (eg. for D/L code tree re-organisation)

c) Release dedicated physical channel (switch from dedicated physical channel to common channels).

d) This procedure can also be used to add further FAUSCH channels (e.g. for use in other cells of the URA, to which a UE might move in the future when the UE already has an RRC connection.)

8.3.5 Mobility Related Procedures

8.3.5.1 Modification of the active set when in Soft hand-over

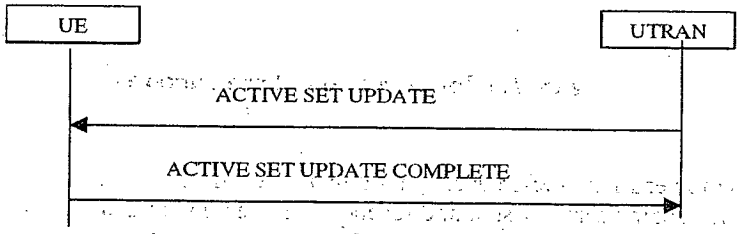

Figure 15) Procedure for modifying the active set when in soft hand-over

There are three alternative ways of modifying the active set which have been identified:

a) Radio link addition

b) Radio link removal

c) Combined radio link addition and removal

Radio link addition is triggered in the network RRC layer. The NW RRC first configures the new radio link. Transmission and reception begin immediately. The NW RRC then sends an ACTIVE SET UPDATE message to the

UE RRC. The UE RRC configures layer 1 to begin reception. After confirmation from the physical layer in UE an ACTIVE SET UPDATE COMPLETE message is sent to the NW RRC

Radio link removal is triggered by the network RRC layer. The radio link is first deactivated by the UE and then in the NW. The NW RRC sends an ACTIVE SET UPDATE message to the UE RRC. The UE RRC requests UE L1 to terminate reception of the radio link(s) to be removed. After this the UE RRC acknowledges radio link removal with an ACTIVE SET UPDATE COMPLETE message to the NW RRC. The NW RRC proceeds to request the NW L1 to release the radio link.

The NW RRC determines the need for radio link replacement. When radio links are to be replaced, the NW RRC first configures the NW L1 to activate the radio link(s) that are being added. The NW RRC then sends an ACTIVE SET UPDATE message to the UE RRC, which configures the UE L1 to terminate reception on the removed radio link(s) and begin reception on the added radio link(s). If the UE active set is full, an old radio link has to be removed before a new one can be added. If the UE has only one radio link, then the replacement must be done in reverse order (first add, then remove). *Note: The present assumption is that the order of the replacement can be left to the UE.* The UE RRC acknowledges the replacement with an ACTIVE SET UPDATE COMPLETE message. The NW RRC then configures the NW L1 to terminate reception and transmission on the removed radio link.

[Editors note: Presumably the radio link replacement procedure can be used for intra-frequency(make before break) hard hand-off]

[Editor's note: TDD active set update will also be supported if the L1 group identifies the requirement]

8.3.5.2 Hard handover (FDD and TDD hard)

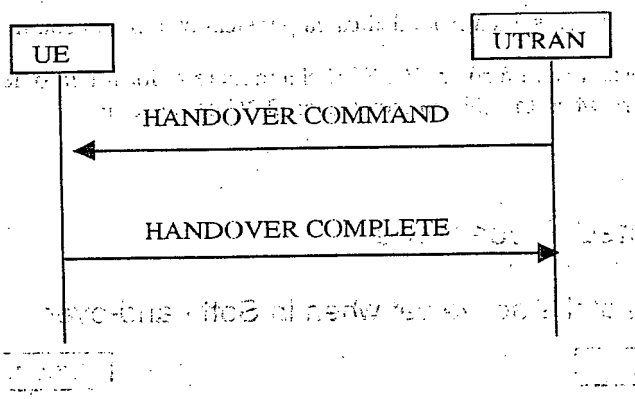

Figure 16) Inter-frequency hard handover

The NW RRC determines the need for inter-frequency hard handover and then configures the NW L1 to activate the new radio links. The NW L1 begins transmission and reception on the new links immediately. The NW RRC then sends the UE RRC a HANDOVER COMMAND message. The message indicates the radio resources that should be used for the new radio link, and can include a FAUSCH channel for the new cell, if the UE has not already been assigned a valid FAUSCH channel for the new cell. The UE RRC configures the UE L1 to terminate reception on the old radio link and begin reception on the new radio link.

After the UE L1 has achieved downlink synchronisation on the new frequency, a L2 link is established and the UE RRC sends a HANDOVER COMPLETE message to the NW RRC. After the L3 acknowledgement has been received, the NW RRC configures the NW L1 to terminate reception and transmission on the old radio link.

[Note 1: Whether it should be possible to setup several radio links immediately on the new frequency is FFS.]

[Note 2: The suspension and resuming of the CC and MM signalling during handover is FFS.]

8.3.5.3 Inter system hard hand-over (GSM/BSS to UTRAN)

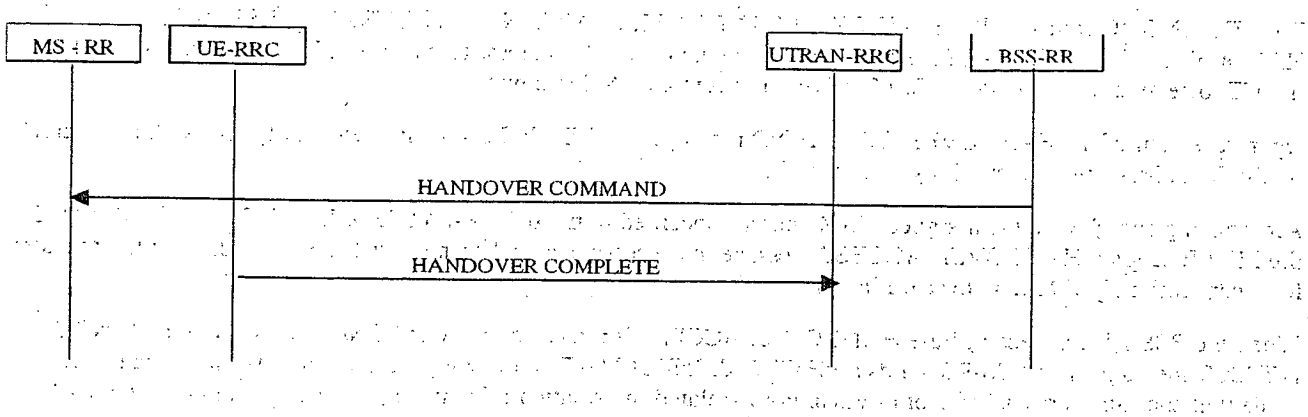

Figure 17) Procedure for Inter-system hard hand-over - GSM to UTRAN

The handover from GSM/BSS to UTRAN for a dual-mode GSM MS / UMTS UE is described.

On the network side, the RRC layer performs admission control and radio resource allocation, assigning an RNTI for the RRC connection and selecting radio resource parameters (such as transport channel type, transport format sets, etc).

The selected parameters including the RNTI, aretransmitted to the UE via the upgraded GSM RR message HANDOVER COMMAND. Upon reception of the HANDOVER COMMAND message, the UE RRC configures L1 and L2 using these parameters to locally establish the DCCH logical channel . Layer 1 indicates to RRC when it has reached synchronisation. An RLC signalling link establishment is then initiated by the UE. A HANDOVER COMPLETE message is finally sent by the UE RRC.

8.3.5.4 Inter system hard hand-over (UTRAN to GSM/BSS, PSTN/ISDN domain services)

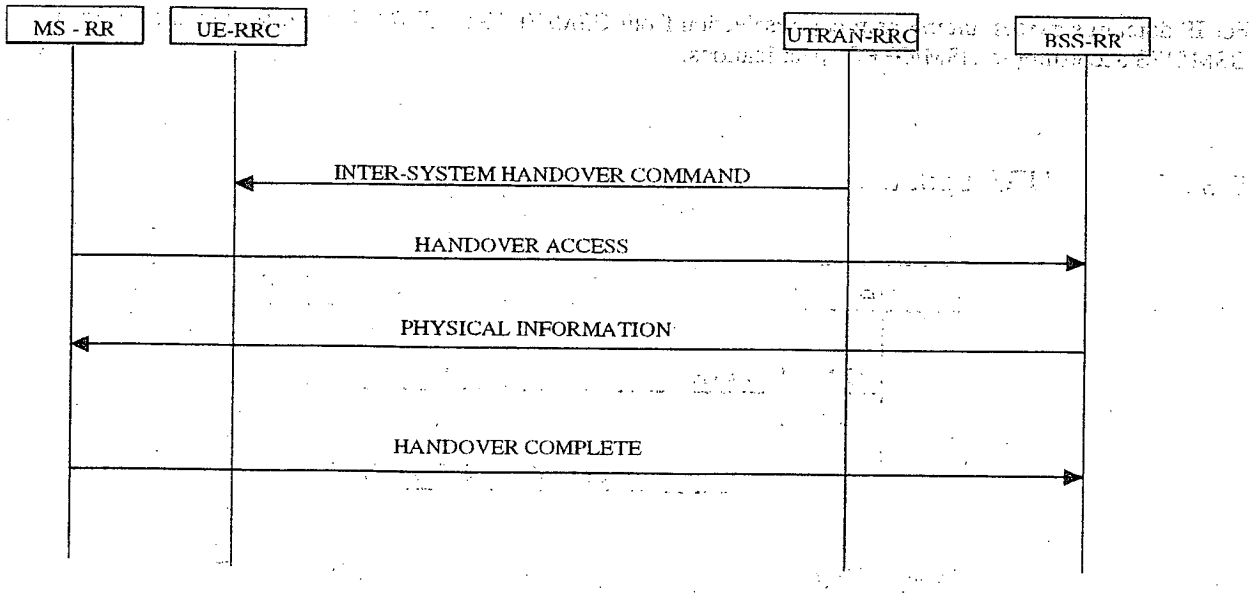

Figure 18) Inter system hard hand-over (UTRAN to GSM/BSS), PSTN/ISDN services, successful case

[Note: The scope of this description is restricted to a UE having a connection only to PSTN/ISDN services, i.e. no simultaneous IP connection]

For PSTN/ISDN domain services UTRAN Inter-System Handover procedure is initiated from the UTRAN.

The UTRAN RRC sends an INTER-SYSTEM HANDOVER COMMAND (type UTRAN-to-BSS HARD HANDOVER) to the UE to start the execution of the handover. This message contains all the information needed for the UE to be able to switch to the GSM cell and perform a GSM handover.

Upon reception of the HANDOVER COMMAND message, the UE RRC layer can then locally release the resources on the RLC, MAC and physical layers of the UE.

After having switched to the assigned GSM channel specified in the INTER-SYSTEM HANDOVER COMMAND, the MS RR sends a HANDOVER ACCESS message in successive layer 1 frames, just as it typically would have done for a conventional GSM handover initiation.

When the BSS-RR has received the HANDOVER ACCESS it indicates this to the CN/AS by sending a HANDOVER DETECT message. The BSS-RR sends a PHYSICAL INFORMATION message to the GSM MS in unacknowledged mode that contains various fields of physical layer -related information allowing a proper transmission by the MS.

After layer 1 and layer 2 connections are successfully established, the GSM MS returns the HANDOVER COMPLETE message.

The UTRAN is then able to release the resources that were used by the UE in UTRAN Connected Mode.

If the UE is unable to execute the Inter-System Handover or if low layer failure happens on the UE side on the GSM/BSS channel before HANDOVER COMPLETE has been sent, the UE deactivates the new GSM/BSS channel and reactivates the UTRAN connection.

The UE then sends a INTER-SYSTEM HANDOVER FAILURE message and resumes normal operation as if no Inter-System Handover have occurred.

8.3.5.5 Inter system cell reselection (UTRAN to GSM/GPRS, IP domain services)

For IP domain services, intersystem cell reselection from UTRAN to GSM/GPRS is initiated by the UE, or ordered by the network with the INTER-SYSTEM HANDOVER COMMAND message.

8.3.5.6 Inter system cell reselection (GSM/GPRS to UTRAN, IP domain services)

For IP domain services, intersystem cell reselection from GSM/GPRS to UTRAN is initiated by the UE or by GSM/BSS according to GSM/GPRS specifications.

8.3.5.7 URA update

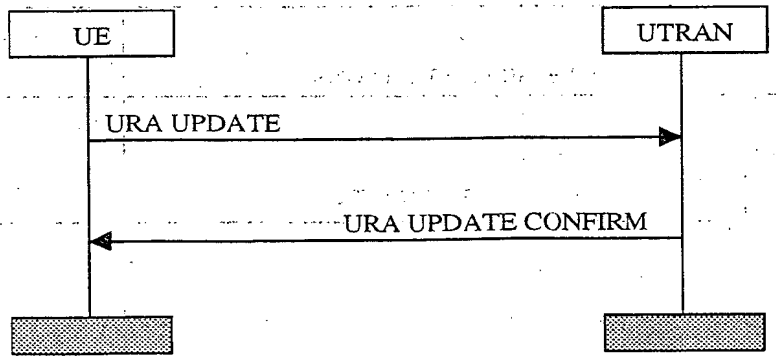

Figure 19) URA update procedure.

The URA update procedure is normally used by the UE to inform the UTRAN that the UE has switched to a new

URA. In that case the procedure is triggered after change of cell and after the UE have read information broadcasted by UTRAN indicating change of URA. The procedure can also be triggered by expiry of a URA update periodicity timer in the UE.

The UE establishes a radio link to a cell in the new URA. After that the UE sends a URA UPDATE message to the UTRAN. Upon reception of the message the UTRAN registers the change of URA, and sends a URA UPDATE CONFIRM message to the UE. The URA UPDATE CONFIRM message may include a new C-RNTI and/or S-RNTI plus SRNC identity.. In the latter case, the UE transmits an RNTI REALLOCATION COMPLETE message as confirmation. The URA UPDATE CONFIRM message may also contain new NAS system information.

[Note1: Whether it should be possible for the UTRAN to trigger a URA update request from the UE is FFS.]

8.3.5.8 Cell update

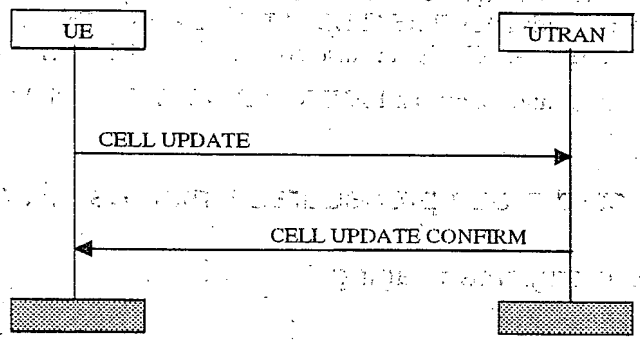

Figure 20) Cell update procedure.

The cell update procedure is normally used by the UE to inform the UTRAN that the UE has switched to a new cell. In this case the procedure is a forward handover procedure, and is triggered after change of cell and after the UE has read information broadcasted by UTRAN. The procedure can also be triggered by expiry of a cell update periodicity timer in the UE or in cases when the UE requests a new C-RNTI.

In case of cell reselection, the UE abandons the radio link to the old cell and establishes a radio link to the new cell. After that the UE sends a CELL UPDATE message to the UTRAN. Upon reception of the message the UTRAN registers any change of cell, and sends a CELL UPDATE CONFIRM message to the UE.

The CELL UPDATE CONFIRM message may include a new C-RNTI and S-RNTI plus SRNC identity. In this case the UE configures layer 2 to use the new identities and returns an RNTI REALLOCATION COMPLETE message as confirmation. In the CELL UPDATE CONFIRM message, the network can instruct the UE to start updating its location on URA level. It may also contain new NAS system information.

The cell update procedure can also include the updating of which FAUSCH channel should be used in the new cell.

In case the UE is assigned a new C-RNTI and/or S-RNTI plus SRNC identity, a RNTI REALLOCATION COMPLETE message is sent by the UE to the network.

[Note1: Whether it should be possible for the UTRAN to trigger a cell update request from the UE is FFS.]

8.3.5.9 RNTI reallocation

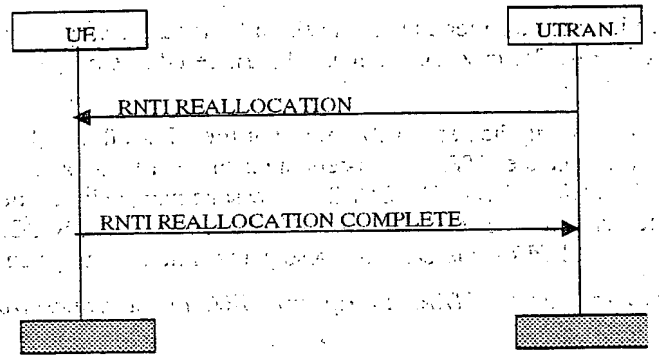

Figure 21) RNTI reallocation procedure

This procedure is used by the network, to assign new Radio Network Temporary Identity (RNTI) information to a UE. It is initiated by the UTRAN, which sends a RNTI REALLOCATION message. The RRC message contains new S-RNTI and SRNC identity, and/or a new C-RNTI. It may also contain new NAS system information.

The UE starts to use the new identities and returns an RNTI REALLOCATION COMPLETE message as confirmation.

8.3.6 RRC Connected mode procedures which use Paging

8.3.6.1 Core network originated paging

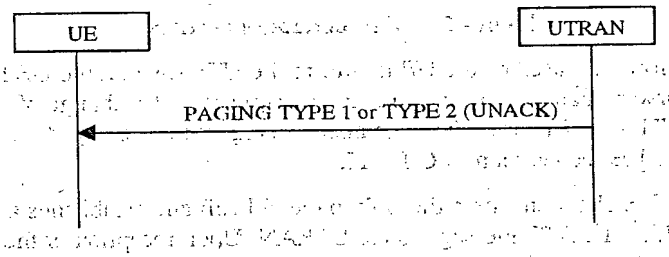

Figure 22) Core network originated paging procedure in connected mode

So far only one example of this procedure has been identified (two others are FFS):

a) UTRAN co-ordinates, UE is on DCCH (PAGING TYPE 2 message is used)

b) UTRAN co-ordinates, UE is on PCCH (FFS, PAGING TYPE 1 message would be used)

c) UE co-ordinates (FFS)

Consider case (a): This procedure enables the CN to request paging of a UE. Since the UE can be reached on the DCCH, the RRC layer formats a PAGING TYPE 2 message containing the UE paging identity and the NAS information, and the message is transmitted directly to the UE using unacknowledged data transfer.

[Note: It is FFS whether only one paging message is required (as used for idle mode paging) or whether both Type 1 and Type 2 paging messages are required]

8.3.6.2 UTRAN originated paging

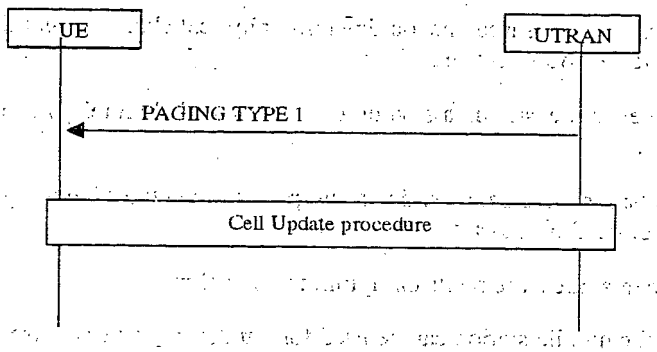

Figure 23) UTRAN originated paging procedure in connected mode

The RRC layer in the network can use this procedure to trigger a switch from PCH or URA connected state to RACH/FACH or RACH+FAUSCH/FACH state. A PAGING TYPE 1 message, containing the S-RNTI and SRNC identity is sent on the PCCH.

In the UE, the RRC layer continuously monitors the paging group on the PCH and compares the UE identities in the received paging messages with its own identities. When a match occurs, the RRC layer uses the cell update procedure to acknowledge the reception of paging and optionally obtain a new C-RNTI.

[Note: It is FFS whether only only one paging message is required (as used for idle mode paging) or whether Type 1 and Type 2 paging messages are also required]

8.3.7 Procedures related to measurement and monitoring

[Note: The following text needs to be reviewed at the next 3GPP WG2 meeting]

In idle mode, the UE monitors and measures neighboring cells according to information received on BCH.

After sending the initial random access message, the UE may continue measurements using the 'idle' mode parameters until a MEASUREMENT CONTROL message is received from the serving RNS. This message indicates the parameters to be used for monitoring in 'connected' state.

Monitored cells are grouped in the UE into three different categories:

1. Cells that belong to the active **set.** User information is sent from all these cells and they are simultaneously demodulated and coherently combined. These cells are involved in soft handover.

2. Cells that are identified as feasible for handover belong to the **candidate set.** The UE may request that a cell in the candidate set is moved to the active set in a MEASUREMENT REPORT message.

3. Other cells that are known, but not currently feasible for handover, belong to the **neighbour set.** The UE does not notify the serving RNS when it moves a cell from the candidate set to the neighbour set or from the neighbour set to the candidate set.

From an RRC point of view, the mobile station measurements can be grouped with respect to the type of measurement performed in the mobile station, i.e., what and how the mobile station shall measure. Examples are:

- Radio link measurements: measurements on downlink radio links in the active set.

- Intra-frequency measurements: measurements on downlink physical channels that do not belong to the active set, but have the same frequency as the active set.
- Inter-frequency measurements: measurements on downlink physical channels with frequencies that differ from the frequency of the active set.
- Inter-system measurements: measurements on downlink physical channels belonging to another radio access system than WCDMA, e.g. PDC or GSM.
- Traffic volume measurements: measurements on uplink traffic volume.

A radio link measurement in the mobile station can be used for handover, power control or operation and maintenance purposes in the network. However, it should be possible to have a number of mobile station measurements running in parallel, where each measurement is controlled and reported independently of each other.

Each type of mobile station measurement is associated with a standardised measurement method that can be described with a limited number of parameters (threshold levels, triggering conditions etc) in the measurement control message from the network.

The measurement control message to the mobile station can be sent using either acknowledged or unacknowledged data transfer (L2 LAC-C) on the DCCH. The acknowledged mode would be employed for critical control messages, e.g. inter-frequency measurements intended for handover. The unacknowledged mode may be used for less critical measurements, e.g. mobile station measurements intended for operation and maintenance purposes.

The measurement report to the network can likewise be sent by either acknowledged or unacknowledged data transfer on the DCCH. The acknowledged mode may be employed for e.g. event-triggered measurement reports, while the unacknowledged mode may be used for e.g. periodical reporting with small periodicity. The network can indicate (report in the mobile station measurement control message) which reporting alternative the mobile station should use for the corresponding measurement.

Elementary RRC procedures that are required for UE measurements, and UE measurement reporting to the UTRAN, are identified and described below. The procedures are used in connected mode.

8.3.7.1 Measurement control

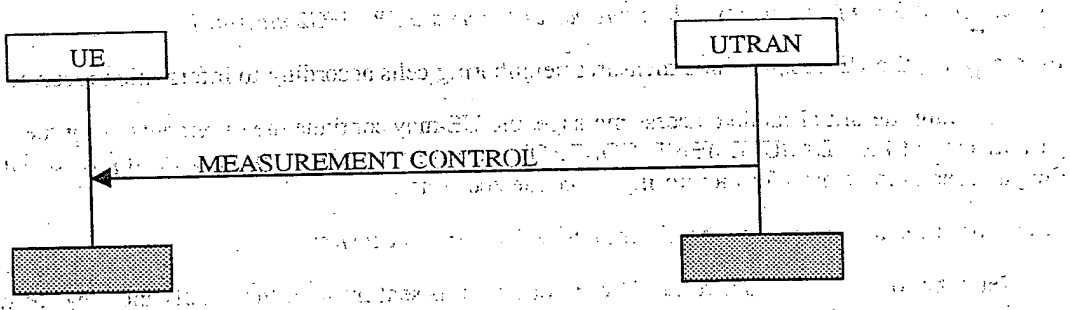

Figure 24) Measurement Control procedure

This procedure is initiated from the UTRAN side to control a measurement in a specific UE. The UTRAN sends a MEASUREMENT CONTROL message to the UE on the DCCH. The message includes the information that controls the UE measurement. Examples of such information are:

1. **Measurement type**: One of the types from a predefined list where each type describes what the UE shall measure.
2. **Measurement identity number**: A reference number that is used by the UTRAN at modification of the measurement and by the UE in the measurement report.
3. **Measurement command**: One out of three different measurement commands
   - Setup: Setup a new measurement.
   - Modify: Modify a previously specified measurement, e.g. change the reporting criteria.

- Release: Stop a measurement and clear all information in the UE that are related to that measurement.

4. **Measurement objects:** The objects the UE shall measure on, and corresponding object information.
5. **Measurement quantity:** The quantity the UE shall measure. This also includes the filtering of the measurements.
6. **Measurement reporting criteria**: The triggering of the measurement report, e.g. periodical, event-triggered or immediate reporting. Here is also specified if the measurement report should be transmitted using either acknowledged or unacknowledged data transfer on the DCCH.

[Editor's note: Details of how this procedure can make use of slotted mode operation is still under investigation.

8.3.7.2 Measurement reporting

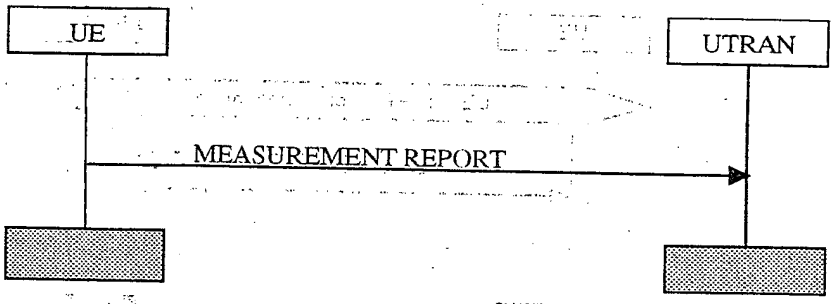

Figure 25) Measurement Report procedure

The Measurement Report procedure is initiated from the UE side when the reporting criteria are met. The message is sent using either acknowledged or unacknowledged data transfer on the DCCH. The UE sends a MEASUREMENT REPORT message to the UTRAN that includes the measurement identity and the measured values of the requested measurement objects.

[Note: UE measurement reports can be sent without prior Measurement Control message, e.g. reports of measurements that are predefined in the standard or defined via system information.]

8.3.8 Other procedures in connected mode

8.3.8.1 Transmission of UE capability information

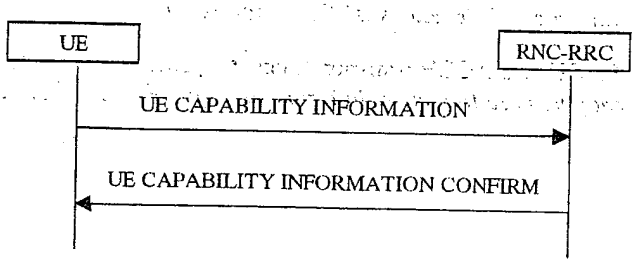

Figure 26) Procedure for transmission of UE capability information

The UE transfers its capability information to the network by transmitting the UE CAPABILITY INFORMATION message on the DCCH. UTRAN acknowledges the successful update of UE capability by UE CAPABILITY

INFORMATION CONFIRM message. This procedure can (optionally) be performed after RRC Connection Setup procedure and also during the lifetime of the RRC Connection if the UE capability information changes (e.g. due to change in UE power class). UE capability information can also explicitly be requested by UTRAN *[Note: The mechanism for this is FFS].*

8.3.8.2 Sending of system information in RRC connected mode

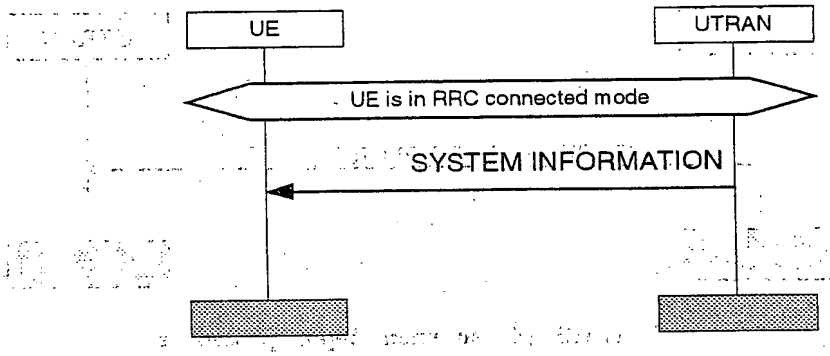

Figure 27) Sending of system information to UE in RRC connected mode

The UTRAN may send dedicated system information messages to the UE in RRC connected mode in order to update e.g. neighbouring cell and MM information. The UE RRC forwards received MM information to the UE MM sublayer.

The system information messages transmitted in connected mode include different combinations of parameters than system information messages for idle mode MSs. The grouping of of system information messages is FFS.

Three ways have been identified by which this signalling can be conveyed:

- On DCCH
- On BCCH *[Editors note,the BCCH may be used to convey information to a UE even when a DCCH exists, and the current assumption is that where DCH exists BCCH is not used]*
- On CCCH mapped onto a FACH or a ACCH transport channel (provided the ACCH transport channel exists). *[Editors note ,the CCCH may be used to convey information to a UE even when a DCCH exists].*

8.3.8.3 Direct transfer

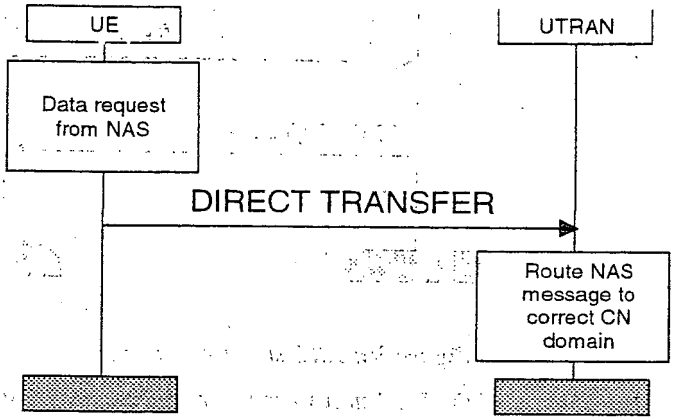

Figure 28) Direct Transfer procedure in uplink

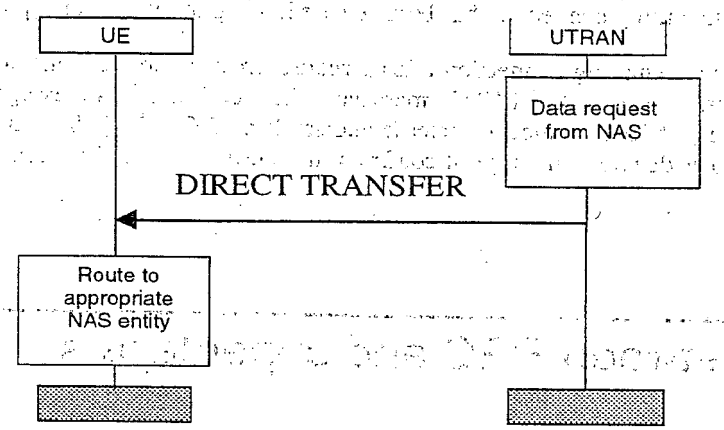

Figure 29) Direct Transfer procedure in downlink

The direct transfer procedure is used to carry all higher layer (NAS) messages over the radio interface. The DIRECT TRANSFER message includes the higher layer (NAS) message as payload and a CN domain identifier of the destination (in uplink) or originating (in downlink) core network node.

The DIRECT TRANSFER message is used both in uplink and in downlink.

Upon reception of the DIRECT TRANSFER message the higher layer PDU is routed – using the CN domain identifier parameter – in UE side to correct higher layer entity and in UTRAN side to correct CN domain.

8.3.8.4 RRC status procedure

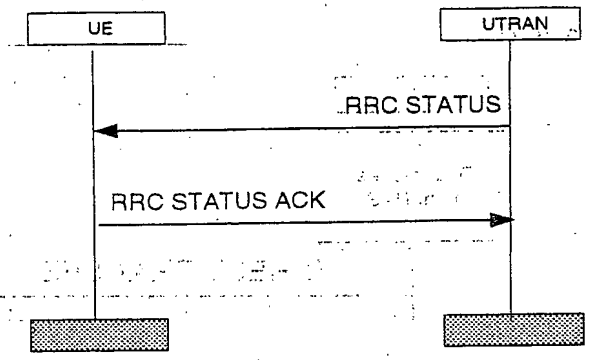

Figure 30: *RRC status procedure*

[Note: The following describes the use of the RRC status procedure for release of signalling connection. Other use of this procedure is FFS.]

If a UE has signalling connections to CN1 and CN2, one of the nodes may request the UTRAN to release the RRC connection. In this case the UTRAN needs to inform the corresponding MM entity in the UE – without releasing the RRC connection - that the signalling connection has been released, using the RRC status procedure.

When the UTRAN receives a signalling connection release request from a core network node, it informs the UE of a signalling connection release with a RRC STATUS message. After receiving this message the UE RRC informs the corresponding UE MM entity of RRC connection release and sends a RRC STATUS ACK to the UTRAN. When the UTRAN receives the acknowledgement message, it confirms the release of signalling connection to the core network node.

9 Primitives between RRC and upper layers

10 Message and information element functional definition and content

The function of each Radio Resource Control message together with message contents as a list of Information elements is defined in subclause 10.1.

The functions of the Information elements are described in subclause 10.2.

Information elements are marked as either M- mandatory, O - Optional or C -conditional.

10.1 Radio Resource Control messages

10.1.1 RRC Connection Mobility Messages

10.1.1.1 ACTIVE SET UPDATE

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UTRAN → UE

Information element category	Information elements	REFERENCE	TYPE	NOTE	
	Message Type		M		
UE information elements	Activation time		O		
Phy CH information elements	Primary CCPCH info		M	Note 1	For each radio link to add
	Downlink DPCH info		M		
	Primary CCPCH info		M	Note 1	For each radio link to delete
	SSDT indicator		O		

Note 1: If it is assumed that primary CCPCH downlink scrambling code is allways allocated with sufficient reuse distances, primary CCPCH downlink scrambling code will be enough for designating the different radiolinks.

10.1.1.2 ACTIVE SET UPDATE COMPLETE

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE→UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
Phy CH information elements	SSDT indicator		O	

10.1.1.3 CELL UPDATE

This message is used by the UE to initiate a cell update procedure.

- RLC-SAP: t.b.d.

  Logical channel: t.b.d.

  Direction: UE→UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
UE information elements	S-RNTI		M	FFS whether in RRC or MAC PDU.
	SRNC identity		M	
	Cell update cause		M	
Measurement information elements	Measurement identity number			Intra-frequency measurement related report (necessity is FFS)
	Measured results			

10.1.1.4 CELL UPDATE CONFIRM

This message confirms the cell update procedure and can be used to reallocate new RNTI information for the UE valid in the new cell.

RLC-SAP: t.b.d.

Logical channel: t.b.d.

Direction: UTRAN→UE

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
UE information elements	S-RNTI		M	FFS whether in RRC or MAC PDU.
	SRNC identity		M	
	S-RNTI		O	New S-RNTI
	SRNC identity		O	New SRNC identity
	C-RNTI		O	New C-RNTI
UTRAN mobility information elements	URA update indicator		O	When present, it instructs UE to make URA updating
CN information elements	PLMN identity		O	(Note1,2)
	CN domain identity		O	For each CN domain (Note1,2)
	NAS system info		O	For each CN domain (Note1,2)

[Note1: It depends on the length of these information whether this message can be used to notify these information to UE.]

[Note2: Necessity of PLMN is FFS and for CN domain identity and NAS system information, the confirmation in SA WG2 is needed.]

10.1.1.5 HANDOVER COMMAND

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UTRAN → UE

Information element category	Information elements	REFERENCE	TYPE	NOTE	
	Message Type		M		
Phy CH information elements	Frequency info		M		
	UL DPCH power control info		M		
	UL DPCH info		M		Uplink radio resources
	UL timeslot info		O		
	Primary CCPCH info		M	For each radio link. Note1	Downlink radio resources
	DL DPCH info		M		
	DL timeslot info		O	Note 2	
	SSDT indicator		O		

Note1: The possibility to request the establishment of several radio links simultaneously with this message is FFS.

Note 2: It is assumed that the DL timeslot configuration is the same for all radio links, whether or not macro-diversity is supported for TDD.

10.1.1.6 HANDOVER COMPLETE

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE → UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
Phy CH information elements	SSDT indicator		O	

10.1.1.7 INTER-SYSTEM HANDOVER COMMAND

This message is used for handover from UMTS to another system e.g. GSM. One or several messages from the other system can be included in the Inter-System message information element in this message. These messages are structured and coded according to that systems specification.

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UTRAN→UE

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
UE information elements	Activation time		O	
Other information elements	Inter-System message		M	

10.1.1.8 INTER-SYSTEM HANDOVER FAILURE

This message is sent on the RRC connection used before the Inter-System Handover was executed. The message indicates that the UE has failed to seize the new channel in the other system.

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE→UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
UE information elements	Inter-System handover failure cause		O	FFS
Other Information elements	Inter-System message		O	

10.1.1.9 URA UPDATE

This message is used by the UE to initiate a URA update procedure.

RLC-SAP: t.b.d.

Logical channel: t.b.d.

Direction: UE→UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
UE information elements	S-RNTI		M	FFS whether in RRC or MAC PDU.
	SRNC identity		M	
	URA update cause		M	

10.1.1.10 URA UPDATE CONFIRM

*<Functional description of this message to be included here>*This message confirms the URA update procedure and can be used to reallocate new RNTI information for the UE valid after the URA update.

RLC-SAP: t.b.d.

Logical channel: t.b.d.

Direction: UTRAN→UE

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
UE information elements	S-RNTI		M	FFS whether in RRC or MAC PDU.
	SRNC identity		M	
	S-RNTI		O	New S-RNTI
	SRNC identity		O	New SRNC identity
	C-RNTI		O	New C-RNTI
CN information elements	PLMN identity		O	(Note1,2)
	CN domain identity		O	For each CN domain (Note1,2)
	NAS system info		O	For each CN domain (Note1,2)

[Note1: It depends on the length of these information whether this message can be used to notify these information to UE.]

[Note2: Necessity of PLMN is FFS and for CN domain identity and NAS system information, the confirmation in SA WG2 is needed.]

10.1.1.11 RNTI REALLOCATION

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: t.b.d.

Direction: UTRAN→UE

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
UE information elements	S-RNTI		O	FFS whether in RRC or MAC PDU.
	SRNC identity		O	
	S-RNTI		O	New S-RNTI
	SRNC identity		O	New SRNC identity
	C-RNTI		O	New C-RNTI
CN information elements	PLMN identity		O	(Note1,2)
	CN domain identity		O	For each CN domain (Note1,2)
	NAS system info		O	For each CN domain (Note1,2)

[Note1: It depends on the length of these information whether this message can be used to notify these information to UE.]

[Note2: Necessity of PLMN is FFS and for CN domain identity and NAS system information, the confirmation in SA WG2 is needed.]

10.1.1.12 RNTI REALLOCATION COMPLETE

This message is used to confirm the new RNTI information for the UE.

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE→UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	

10.1.2 Measurement Messages

10.1.2.1 MEASUREMENT CONTROL

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UTRAN→UE

Information element category	Information elements		REFERENCE	TYPE	NOTE
	Message Type			M	
Measurement Information elements	Measurement Identity Number			M	
	Measurement Command			M	
	Measurement Type			O	
	Measurement Reporting Mode			O	
	Measurement Object	Intra-frequency cell info		C	If Measurement Type = Intra frequency measurement
		Inter-frequency cell info		C	If Measurement Type = Inter frequency measurement
		Inter-system cell info		C	If Measurement Type = Inter system measurement
		Traffic volume measurement object		C	If Measurement Type = Traffic volume measurement
		Quality measurement object		C	If Measurement Type = Quality measurement
	Measurement Quantity (Note1)	Intra-frequency measurement quantity		C	If Measurement Type = Intra frequency measurement
		Inter-frequency measurement quantity		C	If Measurement Type = Inter frequency measurement
		Inter-system measurement quantity		C	If Measurement Type = Inter system measurement
		Traffic volume measurement quantity		C	If Measurement Type = Traffic volume measurement
		Quality measurement quantity		C	If Measurement Type = Quality measurement
	Report ing quantity (Note2)	Intra-frequency measurement reporting quantity		O	If Measurement Type = Intra frequency measurement
		Inter-frequency measurement reporting quantity		O	If Measurement Type = Inter frequency measurement
		Inter-system measurement reporting quantity		O	If Measurement Type = Inter system measurement
		Traffic volume measurement reporting quantity		O	If Measurement Type = Traffic volume measurement
		Quality measurement reporting quantity		O	If Measurement Type = Quality measurement
	Measurement Reporting Criteria (Note3)	Intra-frequency measurement reporting criteria		C	If Measurement Type = Intra frequency measurement
		Inter-frequency measurement reporting criteria		C	If Measurement Type = Inter frequency measurement

		Inter-system measurement reporting criteria		C	If Measurement Type = Inter system measurement
		Traffic volume measurement reporting criteria		C	If Measurement Type = Traffic volume measurement
		Quality measurement reporting criteria		C	If Measurement Type = Quality measurement
		Periodical reporting criteria		C	

Note 1: Necessary only in event trigger reporting mode.

Note 2: It is FFS whether it is necessary to separate the reporting quantity for each type.

Note 3: Periodical reporting criteria is used only in periodical reporting mode and others are used in event trigger mode.

10.1.2.2 MEASUREMENT REPORT

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE→UTRAN

Information element category	Information elements		REFERENCE	TYPE	NOTE	
	Message Type			M		
Measurement Information elements	Measurement Identity Number			M		For each meas.rep. in this message (Note 1)
	Event Result	Intra-frequency measurement event results		C	Necessary only in event trigger reporting mode (Note 2)	
		Inter-frequency measurement event results		C		
		Inter-system measurement event results		C		
		Traffic volume measurement event results		C		
		Quality measurement event results		C		
	Measured Results			O	Necessary only when indicated optionally by Reporting Quantity in Measurement Control	

Note 1: If it is possible to send many measurement results that are identified by different measurement identity numbers in the same Measurement Report is FFS. An alternative solution is to admit only one measurement identity number per Measurement Report and concatenate different Measurement Reports in the RLC layer instead.

Note 2: If it is possible to send many measurement results that are identified by different events in the same Measurement Report is FFS.

10.1.3 Paging and Notification Messages

10.1.3.1 NOTIFICATION

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: PCCH

Direction: UTRAN → UE

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	

10.1.3.2 PAGING TYPE 1

This message is used to send information on the paging channel. One or several UEs, in idle or connected mode,can be paged in one message, which also can contain other information.

RLC-SAP: t.b.d.

Logical channel: PCCH

Direction: UTRAN → UE

Information element Category	RRC Information element	REFERENCE	TYPE	NOTE
	Message Type		M	
UE Information elements	Paging record		M	One paging record for each UE to be paged.
Other information elements	BCCH modification info		O	FFS

10.1.3.3 PAGING TYPE 2

This message is used to page an UE in connected mode, when using the DCCH for CN originated paging.

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UTRAN → UE

Information element Category	RRC Information element	REFERENCE	TYPE	NOTE
	Message Type		M	
UE Information elements	CN domain identity		M	
	Paging cause		M	

10.1.4 RRC Connection Establishment and maintenance messages

10.1.4.1 RRC CONNECTION RE-ESTABLISHMENT

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: t.b.d.

Direction: UTRAN → UE

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	

10.1.4.2 RRC CONNECTION RE-ESTABLISHMENT COMPLETE

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE → UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	

10.1.4.3 RRC CONNECTION RE-ESTABLISHMENT REQUEST

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: t.b.d

Direction: UE → UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE	
	Message Type		M		
UE information elements	S-RNTI		M	FFS whether conveyed on RRC or MAC.	
	SRNC identity		M		
Measurement information elements	Measurement identity number		M	Refers to system information, Note 1	For each measurement report
	Measured results		M		

Note 1: The necessity and usage of Measurement identity number in this message is FFS.

10.1.4.4 RRC CONNECTION RELEASE

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UTRAN→UE

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
UE information elements	Release cause		M	
	Number of Quick Repeat		M	

10.1.4.5 RRC CONNECTION RELEASE COMPLETE

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE → UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	

10.1.4.6 RRC CONNECTION REQUEST

RRC Connection Request is the first message transmitted by the UE when setting up an RRC Connection to the network.

RLC-SAP: t.b.d.

Logical channel: CCCH

Direction: UE → UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE	
	Message Type		M		
UE information elements	Initial UE identity		M	FFS whether conveyed on RRC or MAC.	
	Establishment cause		M		
	Initial UE capability		O	Necessity is FFS	
Measurement information elements	Measurement identity number		M	Refers to system information. Note 1	For each measurement report
	Measured results		M		

Note 1: The necessity and usage of Measurement identity number in this message is FFS.

10.1.4.7 RRC CONNECTION SETUP

This message is used by the network to accept the establishment of an RRC connection for an UE, including assignment of signalling link information, transport channel information and optionally physical channel information.

RLC-SAP: t.b.d.

Logical channel: CCCH

Direction: UTRAN → UE

Information element category	Information elements	REFERENCE	TYPE	NOTE	
	Message Type		M		
UE information elements	Initial UE identity		M	FFS whether conveyed on RRC or MAC.	
	S-RNTI		M		
	SRNC identity		M		
	C-RNTI		O	Only if assigned to a common transport channel	
	Activation time		O		
RAB information elements	RAB identity		M	Indicates the signalling link	
	Signalling link type		M		
	RAB multiplexing info		M	For the signalling link	
TrCH information elements	TFCS		O	Uplink TFCS	
	TFCS		O	Downlink TFCS	
	TFC subset		O		
	Transport channel identity		M	For each new transport channel	Uplink transport channels
	TFS		M		
	Transport channel identity		M	For each new transport channel	Downlink transport channels
	TFS		M		
PhyCH information elements	Frequency info		O		
	Uplink DPCH power control info		O		
	Uplink DPCH info		O	Maximum one of these	Uplink radio resources
	PRACH info		O		
	Uplink timeslot info		O		
	Primary CCPCH info		O	For each radio link	Downlink radio resources
	Downlink DPCH info		O		
	Secondary CCPCH info		O		
	Downlink timeslot info		O	Note 1	
	SSDT indicator		O	Necessity is FFS	
	Gated Transmission Control info		O	FFS	

Note 1: It is assumed that the DL timeslot configuration is the same for all radio links, whether or not macro-diversity is supported for TDD.

10.1.4.8 RRC CONNECTION REJECT

This message is transmitted by the network when the requested RRC connection cannot be accepted.

RLC-SAP: t.b.d.

Logical channel: CCCH

Direction: UTRAN → UE

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
UE information elements	Initial UE identity		M	FFS whether conveyed on RRC or MAC.
	Rejection cause		M	
	Wait time		O	

10.1.4.9 RRC STATUS

This message is transmitted by the network when the network requests UE to release one of several signalling connections.

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UTRAN → UE

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
CN information elements	CN domain identity		M	

10.1.4.10 RRC STATUS ACK

This message is transmitted by UE as an acknowledgement for RRC STATUS message.

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE → UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	

10.1.5 Radio Access Bearer control messages

10.1.5.1 PHYSICAL CHANNEL RECONFIGURATION

This message is used by UTRAN to assign, replace or release a set of physical channels used by a UE.

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UTRAN → UE

Information element category	Information elements	REFERENCE	TYPE	NOTE	
	Message Type		M		
UE Information elements	Activation time		O		
	C-RNTI		O	Only RACH/FACH	
UTRAN mobility Information elements	URA update indicator		O	When PCH shall be used, and when present, it instructs the UE to make URA updating	
PhyCH information elements	Uplink DPCH power control info		O		
	Frequency info		O		
	Uplink DPCH info		O	Maximum one of these	Uplink radio resources
	PRACH info		O		
	Uplink time slot info		O		
	Primary CCPCH info		O	For each radio link	Downlink radio resources
	Downlink DPCH info		O		
	Secondary CCPCH info		O	For FACH	
	Secondary CCPCH info		O	For PCH	
	Downlink timeslot info		O	Note 1	
	SSDT indicator		O	Necessity is FFS	
	Gated Transmission Control info		O	FFS	

Note 1: It is assumed that the DL timeslot configuration is the same for all radio links, whether or not macro-diversity is supported for TDD.

10.1.5.2 PHYSICAL CHANNEL RECONFIGURATION COMPLETE

This message is sent from the UE when a physical channel reconfiguration has been done.

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE → UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
Phy CH information elements	SSDT indicator		O	Necessity is FFS

10.1.5.3 RADIO ACCESS BEARER RECONFIGURATION

This message is sent from UTRAN to reconfigure parameters related to a change of QoS. This procedure can also change the multiplexing of MAC, reconfigure transport channels and physical channels.

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UTRAN → UE

Information element category	Information elements	REFERENCE	TYPE	NOTE	
	Message Type		M		
UE Information elements	Activation time		O		
	C-RNTI			Only RACH/FACH	
RAB information elements	RAB identity		M		For each RAB affected by this message
	RLC info		O	FFS	
	RAB multiplexing info		M		
TrCH information elements	TFCS		O	for uplink DCHs	
	TFCS		O	for downlink DCHs	
	TFC subset		O	for DCHs in uplink	
	Transport channel identity		O	For each removed transport channel	Uplink transport channels
	Transport channel identity		O	For each reconfigured or added transport channel	
	TFS		O		
	Dynamic Control		O	For each reconfigured or added transport channel controlled by DRAC	
	Transmission time validity		O		

	Time duration before retry		O		
	Silent period duration before release		O		
	Transport channel identity		O	For each removed transport channel	Downlink transport channels
	Tranpsort channel identity		O	For each reconfigured or added transport channel	
	TFS		O		
PhyCH information elements	Uplink DPCH power control info		O		
	Frequency info		O		
	Uplink DPCH info		O	Maximum one of these	Uplink radio resources
	PRACH info		O		
	Uplink timeslot info		O		
	Primary CCPCH info		O	For each radio link	Downlink radio resources
	Downlink DPCH info		O		
	Secondary CCPCH info		O		
	Downlink timeslot info		O	Note 1	
	SSDT indicator		O	Necessity is FFS	
	Gated Transmission Control info		O	FFS	

Note 1: It is assumed that the DL timeslot configuration is the same for all radio links, whether or not macro-diversity is supported for TDD.

10.1.5.4 RADIO ACCESS BEARER RECONFIGURATION COMPLETE

This message is sent from the UE when a RAB and signalling link reconfiguration has been done.

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE → UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
RAB information elements	RAB identity		M	For each reconfigured RAB
TrCH information elements	Transport channel identity		O	For each removed, reconfigured or added transport channel
Phy CH information elements	SSDT indicator		O	Necessity is FFS

10.1.5.5 RADIO ACCESS BEARER RELEASE

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UTRAN → UE

Information element category	Information elements	REFERENCE	TYPE	NOTE	
	Message Type		M		
UE Information elements	Activation time		O		
	C-RNTI		O	Only RACH/FACH	
RAB information elements	RAB identity		M	For each released RAB	
	RAB identity		O	For each other RAB affected by this message	
	RAB multiplexing info		O		
TrCH information elements	TFCS		O	for uplink DCHs	
	TFCS		O	for downlink DCHs	
	TFC subset		O	for DCHs in uplink	
	Transport channel identity		O	For each removed transport channel	Uplink transport channels
	Transport channel identity		O	For each reconfigured or added (FFS) transport channel	
	TFS		O		
	Dynamic Control		O	For each reconfigured or added (FFS) transport channel, controlled by DRAC	
	Transmission time validity		O		
	Time duration before retry		O		
	Silent period duration before release		O		
	Transport channel identity		O	For each removed transport channel	Downlink transport channels
	Transport channel identity		O	For each reconfigured or added transport channel	
	TFS		O		
PhyCH information elements	Uplink DPCH power control info		O		
	Frequency info		O		
	Uplink DPCH info		O	Maximum one of these	Uplink radio resources
	PRACH info		O		
	Uplink timeslot info		O		
	Primary CCPCH info		O	For each radio link	Downlink radio resources
	Downlink DPCH info		O		
	Secondary CCPCH info		O		
	Downlink timeslot info		O	Note 1	

Note 1: It is assumed that the DL timeslot configuration is the same for all radio links, whether or not macro-diversity is supported for TDD.

10.1.5.6 RADIO ACCESS BEARER RELEASE COMPLETE

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE → UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
RAB information elements	RAB identity		M	For each released RAB
TrCH information elements	Transport channel identity		O	For each removed, reconfigured or added transport channel

10.1.5.7 RADIO ACCESS BEARER SETUP

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UTRAN → UE

Information element category	Information elements	REFERENCE	TYPE	NOTE		
	Message Type		M			
CN information elements	NAS binding info		M	Transparent non access stratum info e.g. bearer identity.		
UE Information elements	Activation time		O			
	C-RNTI		O	Only RACH/FACH		
RAB information elements	RAB identity		M	For the new RAB		
	RLC info		M			
	RAB multiplexing info		M			
	RAB identity		O	For each other RAB affected by this message		
	RAB multiplexing info		O			
TrCH information elements	TFCS		O	for uplink DCHs		
	TFCS		O	for downlink DCHs		
	TFC subset		O	for DCHs in uplink		
	Transport channel identity		O	For each removed transport channel	Uplink transport channels	
	Transport channel identity		O	For each reconfigured or added transport channel		
	TFS		O			
	Dynamic Control		O	For each reconfigured or added transport channel, controlled by DRAC		
	Transmission time validity		O			
	Time duration before retry		O			
	Silent period duration before release		O			
	Transport channel identity		O	For each removed (FFS) transport channel	Downlink transport channels	
	Transport channel identity		O	For each reconfigured or added transport channel		
	TFS		O			
PhyCH information elements	Uplink DPCH power control info		O			
	Frequency info		O			
	Uplink DPCH info		O	Maximum one of these	Uplink radio resources	
	PRACH info		O			
	Uplink timeslot info		O			
	Primary CCPCH info		O	For each radio link	Downlink radio resources	
	Downlink DPCH info		O			
	Secondary CCPCH info		O			
	Downlink timeslot info		O	Note 1		

	SSDT indicator		O	Necessity is FFS
	Gated Transmission Control info		O	FFS

Note 1: It is assumed that the DL timeslot configuration is the same for all radio links, whether or not macro-diversity is supported for TDD.

10.1.5.8 RADIO ACCESS BEARER SETUP COMPLETE

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE → UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
RAB information elements	RAB identity		M	For each new RAB
TrCH information elements	Transport channel identity		O	For each removed, reconfigured or added transport channel
Phy CH information elements	SSDT indicator		O	Necessity is FFS

10.1.5.9 TRANSPORT CHANNEL RECONFIGURATION

This message is used by UTRAN to configure the transport channel of a UE. This also includes a possible reconfiguration of physical channels. The message can also be used to assign a TFC subset and reconfigure physical channel.

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UTRAN → UE

Information element category	Information elements	REFERENCE	TYPE	NOTE	
	Message Type		M		
UE Information elements	Activation time		O		
	C-RNTI		O	Only RACH/FACH	
	Control-only-state-timer		O	FFS	
TrCH information elements	TFCS		O	for uplink DCHs	
	TFCS		O	for downlink DCHs	
	TFC subset		O	for DCHs in uplink	
	Transport channel identity		O	For each reconfigured transport channel	Uplink transport channels
	TFS		O		
	Dynamic Control		O	For each reconfigured transport channel, controlled by DRAC	
	Transmission time validity		O		
	Time duration before retry		O		
	Silent period duration before release		O		
	Transport channel identity		O	For each reconfigured transport channel	Downlink transport channels
	TFS		O		
PhyCH information elements	Uplink DPCH power control info		O		
	Frequency info		O		
	Uplink DPCH info		O	Maximum one of these	Uplink radio resources
	PRACH info		O		
	Uplink timeslot info		O		
	Primary CCPCH info		O	For each radio link	Downlink radio resources
	Downlink DPCH info		O		
	Secondary CCPCH info		O		
	Downlink timeslot info		O	Note 1	
	SSDT indicator		O	Necessity is FFS	
	Gated Transmission Control info		O	FFS	

Note 1: It is assumed that the DL timeslot configuration is the same for all radio links, whether or not macro-diversity is supported for TDD.

10.1.5.10 TRANSPORT CHANNEL RECONFIGURATION COMPLETE

This message is sent from the UE when a transport channel reconfiguration has been done.

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE → UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
TrCH information elements	Transport channel identity		M	For each reconfigured transport channel
Phy CH information elements	SSDT indicator		O	Necessity is FFS

Note: The usage of this message for indicating the cell the UE will select in the DCH->RACH/FACH case, is FFS.

10.1.5.11 TRANSPORT FORMAT COMBINATION CONTROL

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UTRAN→UE

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
TrCH information elements	TFC subset		M	for DCHs in UL

10.1.6 System Information Messages

10.1.6.1 SYSTEM INFORMATION

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: BCCH or DCCH or CCCH

Direction: UTRAN → UE

NOTE: The division of the system information into messages is FFS.

Information element category	Information elements	REFERENCE	TYPE	NOTE	
	Message Type		M		
CN information elements	PLMN Identity		M		
	CN domain identity		M		For each Core Network Domain.
	NAS system information		M		Information must be included for at least one core network domain type.
UTRAN mobility information elements	URA identity		M		For each URA
	Information for periodic cell and URA update		M		*Note: not for each URA any more*
	Cell identity		M	The necessity and usage of cell identity is FFS.	
	Cell selection and re-selection info		M		
UE information elements	Uplink access control info		M		
	Transmission probability		O	For all UE having DCH controlled by DRAC procedure	For each class of UE Note2
	Maximum bit rate		O		
PhyCH information elements	Frequency info		O	For each RACH	
	PRACH info		M		
	Frequency info		O	For each FACH on secondary CCPCH	
	Secondary CCPCH info		M		
	Frequency info		O	For each PCH on secondary CCPCH	
	Secondary CCPCH info		M		
	PRACH power control info		M		

Measurement Information elements	Measurement Identity Number		M	Note 1	For each Intra-frequency measurement control
	Intra-frequency cell info		M	For each measurement object	
	Intra-frequency measurement quantity		M		
	Intra-frequency measurement reporting criteria		M		
	Measurement Identity Number		M	Note 1	For each Inter-frequency measurement control
	Inter-frequency cell info		M	For each measurement object	
	Inter-frequency measurement quantity		M		
	Inter-frequency measurement reporting criteria		M		
	Measurement Identity Number		M	Note 1	For each Inter-system measurement control
	Inter-system cell info		M	For each measurement object	
	Inter-system measurement quantity		M		
	Inter-system measurement reporting criteria		M		

Note 1: The necessity and usage of Measurement identity number in this message is FFS.

Note 2: The split of parameters into several System Information message X is FFS.

10.1.7 Other Messages

10.1.7.1 UE CAPABILITY INFORMATION

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UE → UTRAN

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
UE information elements	Power control capability		M	
	Code resource capability		M	
	UE mode capability		M	
	Transport CH support capability		O	
	Ciphering capability		M	
	Macro diversity capability		M	

Note: The WG1 and WG4 discussion should be concluded before the contents of this message can be finalized.

10.1.7.2 UE CAPABILITY INFORMATION CONFIRM

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: UTRAN → UE

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	

10.1.7.3 DIRECT TRANSFER

<Functional description of this message to be included here>

RLC-SAP: t.b.d.

Logical channel: DCCH

Direction: both

Information element category	Information elements	REFERENCE	TYPE	NOTE
	Message Type		M	
CN information elements	CN domain identity		M	
	NAS message		M	

10.2 Information element functional definitions

10.2.1 CN Information elements

10.2.1.1 CN domain identity

Points out the core network domain (e.g. IP or PSTN/ISDN CN domain).

10.2.1.2 NAS binding info

A field with non-access stratum information to bind a RAB to the non-access stratum. This information is transparent to RRC.

10.2.1.3 NAS message

A non-access stratum message to be transferred transparently through UTRAN.

10.2.1.4 NAS system information

System information that belongs to the non-access stratum (e.g. LAC, RA code etc). This information is transparent to RRC.

10.2.1.5 PLMN identity

Parameters	REFERENCE	TYPE	NOTE
MCC, Mobile Country Code		M	
MNC, Mobile Network Code		M	

10.2.2 UTRAN mobility Information elements

10.2.2.1 Cell identity

Identity of a cell within a PLMN.

Note: The necessity and usage of this information element is FFS.

10.2.2.2 Cell selection and re-selection info

Parameters	REFERENCE	TYPE	NOTE	
Standby allowed reception level (dBm)		M		The usage of these parameters needs clarification FFS.
Standby prohibited reception level (dBm)		M		
Threshold for Cell Re-selection (dB)		M		
Allowed reception SIR (dB)		M		
Radio link timeout				

10.2.2.3 Information for periodic cell and URA update

FFS.

10.2.2.4 URA identity

Identity of the UTRAN Registration Area.

10.2.2.5 URA update indicator

When present in a message, it instructs the UE to start to update its location on URA level.

10.2.3 UE Information elements

10.2.3.1 Uplink access control info

Parameters	REFERENCE	TYPE	NOTE
Access class		M	FFS
Dynamic persistence level		M	FFS

10.2.3.2 C-RNTI

The controlling RNC RNTI identifies an UE having a RRC connection within an controlling RNC.

10.2.3.3 S-RNTI

The serving RNC RNTI is allocated to an UE having a RRC connection and identifies the UE within its serving RNC.

10.2.3.4 SRNC identity

Identifies the serving RNC for an UE having an RRC connection.

10.2.3.5 Initial UE identity

This information element identifies the UE at a request of an RRC connection.

Parameters	REFERENCE	TYPE	NOTE	

IMSI		O	International Mobile Subscriber Identity	One of these NAS-identities is used	
TMSI + LAI		O	Temporary Mobile Subscriber Identity and Location Area Identity		
P-TMSI + RAI		O	Packet Temporary Mobile Subscriber Identity and Routing Area Identity		
IMEI		O	International Mobile Subscriber Identity		

[Note: The use of these identities is pending confirmation from WG1 that the RACH can support the required payload when these types of ID are used]

10.2.3.6 Activation time

Activation Time defines the frame number (or offset to some known frame number) in which the operation/changes caused by the related message should be executed.

Current assumption is that a connection based CFN (Connection Frame Number) that is known by MS and SRNC could be used.

10.2.3.7 Wait time

Wait time defines the time period the UE has to wait before repeating the rejected procedure.

10.2.3.8 Control-only-state timer

This IE indicates for how long the UE shall stay in the control-only-state. *Editors note: the exact usage of this IE needs some clarification.*

10.2.3.9 Paging record

Parameters	REFERENCE	TYPE	NOTE		
Paging originator		M	UTRAN/CN		
Paging cause		C	For CN originated pages		
CN domain identity					
IMSI		O	International Mobile Subscriber Identity	One of these formats is used	For idle mode pages
TMSI		O	Temporary Mobile Subscriber Identity		
P-TMSI		O	Packet Temporary Mobile Subscriber Identity		
S-RNTI		O	For connected mode pages		
SRNC identity					

10.2.3.10 Establishment cause

Cause for an RRC connection establishment request (originating call, emergency call, paging response, location update request, forward inter-system handover etc).

10.2.3.11 Release cause

Cause for release of RRC connection.

10.2.3.12 Rejection cause

Cause for rejection of RRC connection establishment request.

10.2.3.13 Paging cause

Cause for a CN originated page. *Editors note: The usage of this IE needs further clarification.*

10.2.3.14 Initial UE capability

This is the UE capability information given in the RRC connection request message. The exact type of information is FFS.

10.2.3.15 Power control capability

Parameters	REFERENCE	TYPE	NOTE
Transmission power capability		M	

Note: The WG1 and WG4 discussion should be concluded before the contents of this IE can be finalized.

10.2.3.16 Code resource capability

Parameters	REFERENCE	TYPE	NOTE
DL multi-code capability			
UL multi-code capability			
DL Spreading factor capability			
UL Spreading factor capability			

Note: The WG1 and WG4 discussion should be concluded before the contents of this IE can be finalized.

10.2.3.17 UE mode capability

Parameters	REFERENCE	TYPE	NOTE
System capability (UMTS/GSM/others)			
UMTS capability (TDD/FDD)			
Chip rate capability			
Radio Frequency capability			
Variable duplex distance capability			

Note: The WG1 and WG4 discussion should be concluded before the contents of this IE can be finalized.

10.2.3.18 Transport channel support capability

Parameters	REFERENCE	TYPE	NOTE
Maximum number of DCHs			
Support for Transport CH			

Note: The WG1 and WG4 discussion should be concluded before the contents of this IE can be finalized.

10.2.3.19 Ciphering capability

Parameters	REFERENCE	TYPE	NOTE
Ciphering Algorithm capability		M	

Note: The WG1 and WG4 discussion should be concluded before the contents of this IE can be finalized.

10.2.3.20 Macro diversity capability

Parameters	REFERENCE	TYPE	NOTE
Maximum number of RLs		M	

Note: The WG1 and WG4 discussion should be concluded before the contents of this IE can be finalized.

10.2.3.21 Cell update cause

Indicates the cause for s cell update. Examples of causes are cell reselection and periodic cell update.

10.2.3.22 URA update cause

Indicates the cause for s URA update. Examples of causes are change of URA and periodic URA update.

10.2.3.23 Number of Quick Repeat

Indicates the number of quick repeat for RRC Connection Release Complete message.

10.2.3.24 Inter-system handover failure cause

The purpose of this IE is to provide a reason for the failure of the Inter-system handover.

10.2.3.25 Transmission probability

Indicates the probability for a mobile to be allowed to transmit on a DCH controlled by DRAC procedure.

10.2.3.26 Maximum bit rate

Indicates the maximum user bit rate allowed on a DCH controlled by DRAC procedure for the transmission period (Transmission time validity).

10.2.4 Radio Access Bearer Information elements

10.2.4.1 RAB identity

An identification number for the RAB affected by a certain message.

10.2.4.2 RLC info

Parameters	REFERENCE	TYPE	NOTE	
RLC mode		M	Indicates if the RLC entity for a certain RAB should use Acknowledged, Non Acknowledged or Transparent mode data transfer. *[Note: It is FFS if this parameter always is the same in both UL and DL.]*	Uplink RLC info
RLC in-sequence delivery		O	Indication if RLC should preserve the order of higher layer PDUs that were transmitted through RLC. *[Note: It is FFS if this parameter always is the same in both UL and DL.]*	
RLC PDU size		C	Size of RLC Protocol Data Units. See Note 1	
RLC transmission window size		O	A flow control parameter used to set the maximum number of RLC PDUs sent without getting them acknowledged	
RLC retransmission info		M	This could be the number of attempts to retransmit a RLC PDU before it is discarded, or different timer values.	
RLC mode		M		Downlink RLC info
RLC in-sequence delivery		O		
RLC PDU Size		M	Note 1	
RLC transmission window size		O		
RLC retransmission info		O	*Is this needed to send to the UE for downlink?*	

Note1: RLC PDU size may be derived from transport block size and not explicitly transfered across the radio interface.

10.2.4.3 Signalling link type

The purpose of the Signalling Link Type information element is to indicate the RLC parameters needed for the signalling link.

Each possible value of Signalling Link Type information element refers to a predefined set of parameters. Details FFS.

10.2.4.4 RAB multiplexing info

A multiplexing option for each possible transport channel this RAB can be multiplexed on.

Parameters	REFERENCE	TYPE	NOTE		
Transport channel identity		O	This is the ID of a transport channel that this RAB could be mapped onto.	Uplink multi-plexing	For each multi-plexing option
Logical channel identity		O	This parameter is used to distinguish logical channels multiplexed by MAC on a transport channel.		
MAC logical channel priority		O	This includes both priority between different users traffic when using a common or shared channel, and between different RABs (or logical channels) traffic for a certain user. Different priorities for one users´ RABs are mapped (through the MAC´s T and C/T MUXes) to the TFC selection algorithm. *[Note: Usage and precise meaning of this is FFS.]*		
Transport channel identity		O		Downlink multi-plexing	
Logical channel identity		O			

Note: The necessity of dividing RAB multiplexing into in uplink and downlink is FFS.

10.2.5 Transport CH Information elements

10.2.5.1 Transport Format Combination Set

Indicates the allowed combinations of already defined Transport formats.

10.2.5.2 Transport Format Combination Subset

Indicates which Transport format combinations in the already defined Transport format combination set that are allowed.

10.2.5.3 Transport channel identity

This information element is used to distinguish transport channels (both common and dedicated transport channels).

10.2.5.4 Transport Format Set (TFS)

Parameters	REFERENCE	TYPE	NOTE
Transport block size(s)			(dynamic)
Transport Block Set Size(s)			(dynamic)
Transmission time interval			(semi-static)
Type of channel coding			(semi-static)
Rate matching			(semi-static)

10.2.5.5 Dynamic Control

Indicates if this transport channel is controlled by DRAC procedure or not.

10.2.5.6 Transmission time validity

Indicates the duration for which permission is granted on a DCH controlled by DRAC procedure.

10.2.5.7 Time duration before retry

Indicates the time duration before retrying to get the transmission permission on a DCH controlled by DRAC procedure, in case permission has not been granted.

10.2.5.8 Silent period duration before release

Indicates the maximum silent period duration before releasing the resource. This parameter may be merged with the Fkp-b parameter defined in the 'Transmission stop and resumption control' procedure defined in [1].

(Note: [1] RAN/WG1 S1.14 document)

10.2.6 Physical CH Information elements

10.2.6.1 Frequency info

Parameters	REFERENCE	TYPE	NOTE
Frequency number		M	Designate the centerfrequency of the uplink carrier
Duplex distance		O	
Chip rate		O	
Mode		O	Designate FDD or TDD mode

10.2.6.2 Primary CCPCH info

Parameters	REFERENCE	TYPE	NOTE
DL scrambling code		M	DL scrambling code used for Primary CCPCH

10.2.6.3 Secondary CCPCH info

Parameters	REFERENCE	TYPE	NOTE
DL scrambling code		O	Only needed if different from DL scrambling code of Primary CCPCH
Channelization code		M	

10.2.6.4 PRACH info

Parameters	REFERENCE	TYPE	NOTE
Access slot		M	For each allowed access slot for the preambles
Preamble spreading code		M	For each code to use for spreading of the preamble. There is also a one to one mapping from preamble code to what scrambling code to use for the message part.
Preamble signature		M	For each allowed preamble signature.
Spreading factor		M	For each rate or SF that are allowed to use on the data part (I-branch) in the message part of the random-access

10.2.6.5 PRACH power control info

Parameters	REFERENCE	TYPE	NOTE
UL target SIR		M	The usage of these parameters needs clarification and are also dependent on the WG1 RACH discussions.
Primary CCPCH DL TX power		M	
UL interference		M	
Constant value		M	

10.2.6.6 Uplink DPCH info

Parameters	REFERENCE	TYPE	NOTE
UL scrambling code		M	What short or long uplink scrambling code a certain UE should use

DPCCH channelization code		M	SF of the channelization code for control part. *[The necessity of this parameter is FFS.]*	
DPDCH channelization code		M	SF of the channelization code for data part	For each DPDCH

10.2.6.7 Uplink DPCH power control info

Interference level measured for a frequency at the UTRAN access point used by UE to set DPCH initial output power.

10.2.6.8 Downlink DPCH info

Parameters	REFERENCE	TYPE	NOTE	
DL scrambling code		O	Only needed if different from DL scrambling code of Primary CCPCH	
DL channelization code		M	Channelization codes to be used in the downlink for DPCH	For each DPCH

10.2.6.9 Uplink timeslot info

Parameters	REFERENCE	TYPE	NOTE	
Slot number		M	Timeslot to be used in uplink (TDD only)	For each slot

10.2.6.10 Downlink timeslot info

Parameters	REFERENCE	TYPE	NOTE	
Slot number		M	Timeslot to be used in downlink (TDD only)	For each slot

10.2.6.11 SSDT indicator

This information element indicates the status (e.g. initiated/terminated) of the Site Selection

Diversity Transmit power control (SSDT). In the direction UTRAN to UE it is used to change the SSDT status. In the direction UE to UTRAN it is used to confirm the SSDT status by the UE.

10.2.6.12 Gated Transmission Control info (FFS)

Parameters	REFERENCE	TYPE	NOTE
Gating pattern		M	Indicates periodical or random (FFS)
Gating rate		M	Indicates no gating, 1/2 gating, 1/4 gating or 1/8 gating (FFS)
Gating activation time		M	FFS

10.2.7 Measurement Information elements

10.2.7.1 Measurement Identity Number

A reference number that is used by the UTRAN at modification and release of the measurement, and by the UE in the measurement report.

10.2.7.2 Measurement Command

One out of three different measurement commands

- Setup: Setup a new measurement.
- Modify: Modify a previously specified measurement, e.g. change the reporting criteria.
- Release: Stop a measurement and clear all information in the UE that are related to that measurement.

10.2.7.3 Measurement Type

One of the types from a predefined list where each type describes what the UE shall measure. The types are:

- Intra-frequency measurements
- Inter-frequency measurements
- Inter-system measurements
- Traffic volume measurements
- Quality measurements

10.2.7.4 Reference time difference to cell

The reference time difference to cell indicates the time difference between the primary CCPCH of the current cell and the primary CCPCH of a neighbouring cell. It is notified to UE by System Information or Measurement Control message.

In case of macro-diversity the reference is the primary CCPCH of one the cells used in the active set.

Editors note: Exactly how the reference cell is pointed out in this case in the messages is FFS.

10.2.7.5 Measured time difference to cell

The measured time difference to cell indicates the time difference which is measured by UE between the primary CCPCH of the current cell and the primary CCPCH of a neighbouring cell. It is notified to SRNC by Measurement Report message or Measurement Information Element in other RRC messages.

In case of macro-diversity the reference is the primary CCPCH of one the cells used in the active set.

Editors note: Exactly how the reference cell is pointed out in this case in the messages is FFS.

10.2.7.6 Measurement reporting mode

Contains the type of Measurement Report transfer mode and the indication of periodical/event trigger.

Parameters	REFERENCE	TYPE	NOTE
Measurement Report Transfer Mode		M	Acknowledged / Unacknowledged
Periodical Reporting / Event Trigger Reporting Mode		M	Periodical reporting / Event trigger

10.2.7.7 Intra-frequency cell info

Contains the measurement object information for an intra-frequency measurement.

Parameters	REFERENCE	TYPE	NOTE
Primary CCPCH info		M	
Primary CCPCH DL TX power		O	
UL load		O	FFS
Reference time difference to cell		O	

10.2.7.8 Inter-frequency cell info

Contains the measurement object information for an inter-frequency measurement.

Parameters	REFERENCE	TYPE	NOTE
Frequency info		M	
Primary CCPCH info		M	
Primary CCPCH DL TX power		O	FFS
UL load		O	FFS
Reference time difference to cell		O	FFS

10.2.7.9 Inter-system cell info

Contains the measurement object information for an inter-system measurement.

Parameters	REFERENCE	TYPE	NOTE
System type		M	E.g. GSM
System specific measurement info			E.g frequency, timeslot, colour code, output power.

10.2.7.10 Traffic volume measurement object

Contains the measurement object information for a traffic volume measurement.

Parameters	REFERENCE	TYPE	NOTE
Target Transport CH ID		M	

10.2.7.11 Quality measurement object (FFS)

(Note: Only the section is made.)

10.2.7.12 Intra-frequency measurement quantity

The quantity the UE shall measure in case of intra-frequency measurement. It also includes the filtering of the measurements.

Parameters	REFERENCE	TYPE	NOTE	
Primary CCPCH RX E_c/I_0		O		One of these is mandatory
Primary CCPCH RX SIR (RSCP/ISCP)		O	FFS	
Primary CCPCH RX power (RSCP)		O	FFS	
Path loss		O	FFS	
Path loss plus UL load		O	FFS	

(Note: Above measurements except for Ec/Io are not concluded in WG1)

10.2.7.13 Inter-frequency measurement quantity (FFS)

The quantity the UE shall measure in case of inter-frequency measurement. It also includes the filtering of the measurements.

Parameters	REFERENCE	TYPE	NOTE	
E_c/I_0		O	FFS	One of these is mandatory
DL Path loss		O	FFS	
SIR		O	FFS	
DL path loss plus UL interference		O	FFS	
Received signal code power (RSCP)		O	FFS	

10.2.7.14 Inter-system measurement quantity (FFS)

The quantity the UE shall measure in case of inter-system measurement. It also includes the filtering of the measurements.

Parameters	REFERENCE	TYPE	NOTE	
E_c/I_0		O	FFS	One of these is mandatory
Signal strength		O		
Path loss		O	FFS	
Colour code		M	GSM only	

10.2.7.15 Traffic volume measurement quantity

Contains the measurement quantity information for a traffic volume measurement.

Parameters	REFERENCE	TYPE	NOTE
RLC buffer payload		M	

(Note: If there is no other measurement quantity, this parameter can be removed since it can be implicitly known by UE.)

10.2.7.16 Quality measurement quantity (FFS)

(Note: Only the section is made.)

10.2.7.17 Intra-frequency reporting quantity

Contains the reporting quantity information for an intra-frequency measurement.

Parameters	REFERENCE	TYPE	NOTE
Primary CCPCH RX E_c/I_0		O	
Primary CCPCH RX SIR (RSCP/ISCP)		O	FFS
Primary CCPCH RX power (RSCP)		O	FFS
Path loss		O	FFS
Path loss plus UL load		O	FFS
Measured time difference to cell		O	
DL Transport CH BLER		O	
DL Transport CH BER		O	FFS
UE Transmission Power		O	
UE Position		O	
Cell ID		O	FFS

(Note: It is FFS whether the reporting quantity parameters used in different measurement types can be used commonly for all types of reporting quantity. If they can, only "Reporting Quantity" is enough instead of specifying 5 types of reporting quantity.)

10.2.7.18 Inter-frequency reporting quantity (FFS)

(Note: Only the section is made.)

10.2.7.19 Inter-system reporting quantity (FFS)

(Note: Only the section is made.)

10.2.7.20 Traffic volume reporting quantity

Contains the reporting quantity information for a traffic volume measurement.

Parameters	REFERENCE	TYPE	NOTE
RLC buffer payload for each RAB		O	
DL Transport CH BLER		O	
DL Transport CH BER		O	FFS
UE Transmission Power		O	
UE Position		O	
Cell ID		O	FFS

(Note: It is FFS whether the reporting quantity parameters used in different measurement types can be used commonly for all types of reporting quantity. If they can, only "Reporting Quantity" is enough instead of specifying 5 types of reporting quantity.

10.2.7.21 Quality reporting quantity (FFS)

(Note: Only the section is made.)

10.2.7.22 Intra-frequency measurement reporting criteria

The triggering of the event-triggered reporting for an intra-frequency measurement. All events concerning intra-frequency measurements are labeled 1x where x is a, b, c....

Event 1a: A Primary CCPCH enters the Reporting Range [Note1]

Event 1b: A Primary CCPCH leaves the Reporting Range [Note2]

Event 1c: A Non-active Primary CCPCH becomes better than an active Primary CCPCH [Note3]

Event 1d: Change of best cell [Note4, 5]

Event 1e: Other types of ranking of Primary CCPCHs (FFS)

Parameters		REFERENCE	TYPE	NOTE
Common parameter for all events	Max number of reporting cells		M	
For each event	Event ID		M	1a, 1b, 1c, 1d or 1e

Reporting Range		C	In event 1a,1b
Hysteresis		C	In event 1c,1d
Time to trigger		M	Indicates the period of time between the timing of event detection and the timing of sending Measurement Report.
Amount of reporting		M	Measurement for the indicated Transport CH ID is "released" after the indicated amount of reporting from the UE itself. FFS
Reporting interval		M	Indicates the interval of periodical report during the event is in the detected state FFS

[Note1: whether or not PCCPCH can be active is FFS]

[Note2: whether or not PCCPCH can be non-active is FFS]

[Note3: Details are FFS: It has been suggested to divide this event into two cases; I) a non-active PCCPCH exceeds the weakest active PCCPCH, II) a non-active PCCPCH exceeds the strongest active PCCPCH]

[Note4: When best PCCPCH in active set changes, all active cells are reported.]

[Note5: Whether this event can result in the reporting of non-active cells in addition to active cells is FFS.]

10.2.7.23 Inter-frequency measurement reporting criteria (FFS)

The triggering of the measurement report, e.g. periodical, event-triggered or immediate reporting for an inter-frequency measurement. Here is also specified if the measurement report should be transmitted using either acknowledged or unacknowledged data transfer on the DCCH.

Parameters	REFERENCE	TYPE	NOTE

10.2.7.24 Inter-system measurement reporting criteria (FFS)

The triggering of the measurement report, e.g. periodical, event-triggered or immediate reporting for an inter-system measurement. Here is also specified if the measurement report should be transmitted using either acknowledged or unacknowledged data transfer on the DCCH.

10.2.7.25 Traffic volume measurement reporting criteria

Contains the measurement reporting criteria information for a traffic volume measurement.

Parameters		REFERENCE	TYPE	NOTE
Common parameter for all transport CH				
For each transport CH	Transport CH ID		M	
	Threshold		M	
	Time to trigger		M	Indicates the period of time between the timing of event detection and the timing of sending Measurement Report.
	Amount of reporting		M	Measurement for the indicated Transport CH ID is "released" after the indicated amount of reporting from the UE itself. FFS
	Reporting interval		M	Indicates the interval of periodical report during the event is in the detected state FFS

10.2.7.26 Quality measurement reporting criteria (FFS)

(Note: Only the section is made.)

10.2.7.27 Periodical reporting criteria

Contains the periodical reporting criteria information. It is necessary only in the periodical reporting mode.

Parameters		REFERENCE	TYPE	NOTE
	Max number of reporting cells		O	Indicates the maximum number of cells to report.

	Amount of reporting		O	Measurement is "released" after the indicated amount of reporting from the UE itself
	Reporting interval		O	Indicates the interval of periodical report.

10.2.7.28 Intra-frequency measurement event results

This IE contains the measurement event results that are reported to UTRAN for intra-frequency measurements.

Parameters	REFERENCE	TYPE	NOTE
Event ID.		M	
Primary CCPCH info		M	

10.2.7.29 Inter-frequency measurement event results (FFS)

This IE contains the measurement event results that are reported to UTRAN for inter-frequency measurements.

The further division of this IE into parameters is FFS.

10.2.7.30 Inter-system measurement event results (FFS)

This IE contains the measurement event results that are reported to UTRAN for inter-system measurements.

The further division of this IE into parameters is FFS.

10.2.7.31 Traffic volume measurement event results

Contains the event result for a traffic volume measurement.

Parameters	REFERENCE	TYPE	NOTE
Transport CH ID		M	

10.2.7.32 Quality measurement event results (FFS)

(Note: Only the section is made.)

10.2.7.33 Measured results

Contains the measured results of the quantity indicated optionally by Reporting Quantity in Measurement Control. "Measured results" can be used for both event trigger mode and periodical reporting mode.

Parameters	REFERENCE	TYPE	NOTE
RAB ID + RLC buffers payload		O	
PCCPCH Info + Primary CCPCH RX E_c/I_0		O	
PCCPCH Info + Primary CCPCH RX SIR (RSCP/ISCP)		O	FFS
PCCPCH Info + Primary CCPCH RX power (RSCP)		O	FFS
PCCPCH Info + Path loss		O	FFS
PCCPCH Info + Path loss plus UL load		O	FFS
PCCPCH Info + Measured time difference to cell		O	
DL Transport CH BLER		O	
DL Transport CH BER		O	FFS
UE Transmission Power		O	
UE Position		O	
Cell ID		O	FFS

10.2.8 Other Information elements

10.2.8.1 BCCH modification info

Indicates modification of the System Information on BCCH.

Parameters	REFERENCE	TYPE	NOTE
BCCH modification type		M	FFS
Modification time		O	FFS

10.2.8.2 Inter-system message

This Information Element contains one or several messages that are structured and coded according to the specification used for the system type indicated by the first parameter.

Parameters	REFERENCE	TYPE	NOTE
System type		M	E.g. GSM
Message(s)		M	Formatted and coded according to specification for the indicated system type.

11 Message and Information element abstract syntax (with ASN.1)

This chapter contains definitions for RRC PDUs and IEs using a subset of ASN.1 as specified in I2.01. PDU and IE definitions are grouped into separate ASN.1 modules.

Note that the proposal is to keep both chapter 10 and 11 (at least until all messages and information elements are fully discussed and agreed by 3GPP RAN WG2). Chapter 10 is intended to give an abstract description (in English) of the messages and information elements whereas chapter 11 should contain the exact normative definitions with all necessary details.

12 Message transfer syntax

Transfer syntax for RRC PDUs is derived from their abstract syntax definitions by use of encoding rules.

13 Protocol states

Service state diagram(s) of the RRC sublayer. (E.g. like in GSM0407.)

14 Protocol timers, counters and other parameters

Description of timers and counters and possible other parameters related to RRC procedures.

15 Specific functions (if applicable)

< description of chapter scope and contents >

16 Handling of unknown, unforeseen and erroneous protocol data

This section specifies procedures for the handling of unknown, unforeseen, and erroneous protocol data by the receiving entity. These procedures are called "error handling procedures".

17 SDL

This section describes the functionality of the protocol in descriptive SDL.

18 Appendices: Examples of operation

19 History

Document history		
Date	**Version**	**Comment**
January 1999	0.0.1	Created following the first 3GPP WG2 meeting . Text from two documents were merged. These documents were: ETSI SMG2 UMTS L23 EG document: 'Description of the RRC protocol, YY.31, v0.2.0, ETSI L23EG Tdoc 065/99, January 19, 1999. and TTC/ARIB document: 'Draft UE-UTRAN L3 RRC signalling protocol', Vol. 9, Ver 1.0.0, January 14, 1999, ETSI L23 EG Tdoc 010/99 The ETSI document was taken as the baseline document and change marks are given in v 0.0.1 of S2.31 with respect to the ETSI document.
March 1999	0.0.2	Updated according to 3GPP template. There were no changes to S2.31 agreed at the January 1999 meeting
April 1999	0.1.0	Updated to include new message and information element functional descriptions as described in TSGR2#3(99)220 (report of RRC email ad-hoc). New chapter headings 10-17 have been added and Annex 1 removed. Text updated to reflect new definitions for paging messages.
April 1999	TS 25.331 V1.0.0	Noted by TSG-RAN as TS 25.331V1.0.0
May 1999	V1.0.1	Tables in Section 10 edited so that they read correctly when opened from WORD 6.0
June 1999	V1.1.0	Edited following May 1999 RAN2meeting. Includes modifications to RRC procedures agreed in RRC procedures email ad-hoc (and mostly captured in Tdoc 376). Note that new procedures on RNTI re-allocation and RRC status added. Also includes a large number of modifications to RRC parameters and information elements most of which were captured in Tdoc 380. Updated to WORD 97.
June 1999	V1.1.0	Noted by TSG-RAN
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This document is written using Microsoft Word 97.